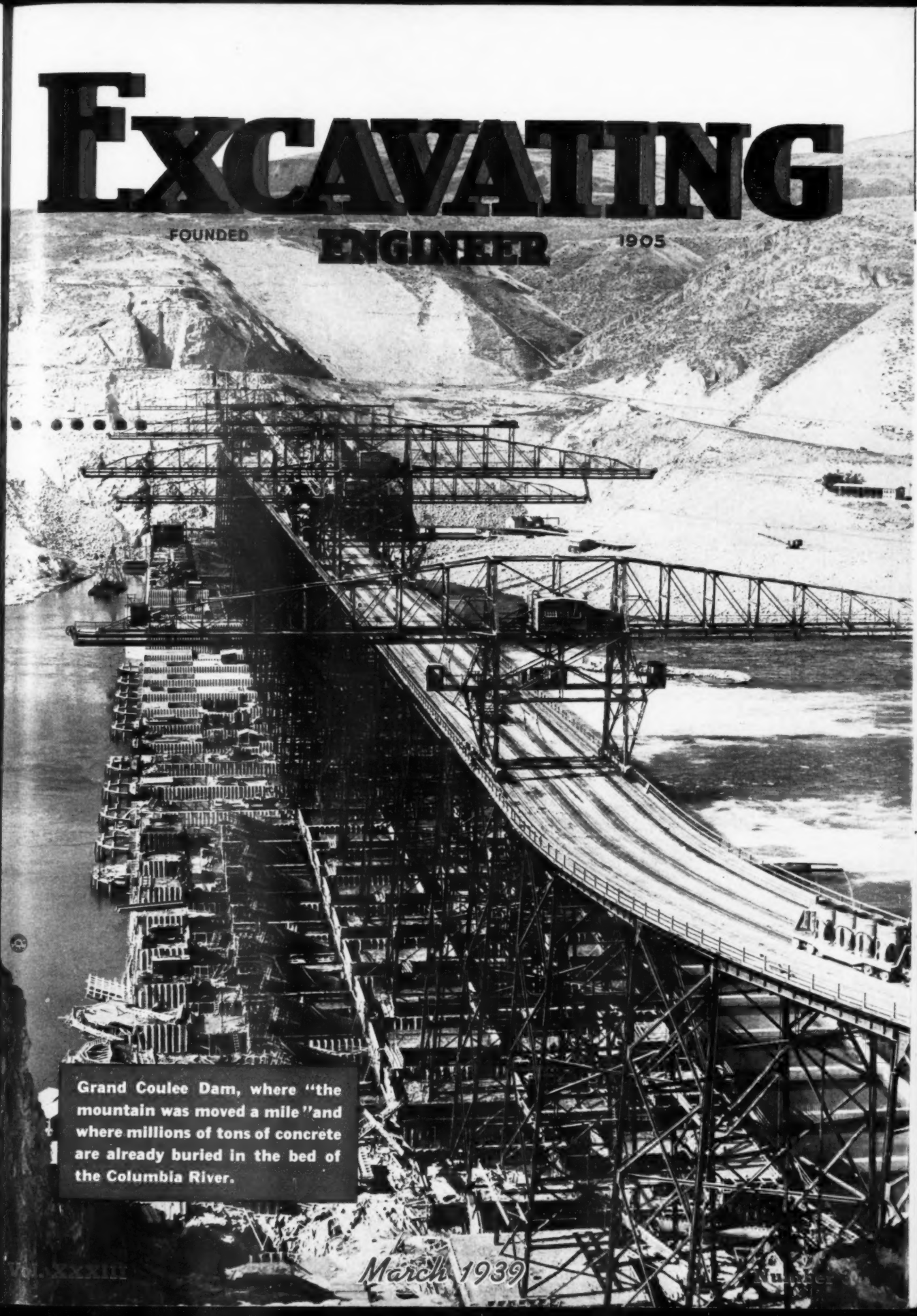
EXCAVATING ENGINEER

FOUNDED 1905



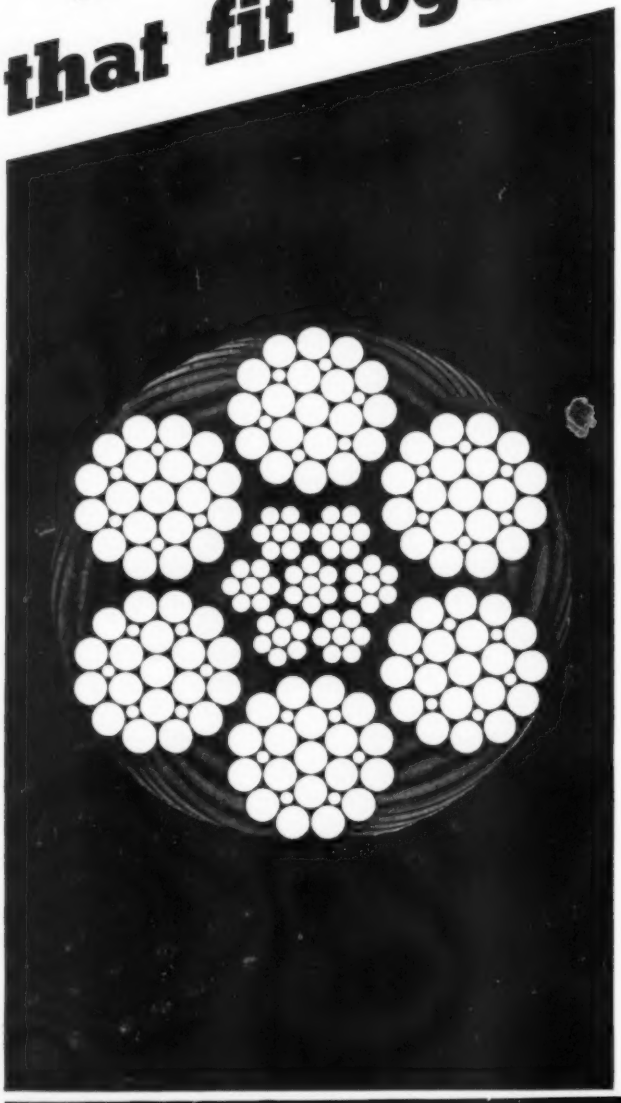
Grand Coulee Dam, where "the mountain was moved a mile" and where millions of tons of concrete are already buried in the bed of the Columbia River.

Vol. XXXIII March 1939 Number 3

PURPLE-STRAND *FORM-SET* SHOVEL ROPE

BETHLEHEM Specify FORM-SET PRE-FORMED ROPE

199 moving parts that fit together perfectly



HERE are the moving parts of a heavy-duty machine—a Purple-Strand Form-Set Shovel Rope, 6 x 25 construction, IWRC. There are 199 of these parts, and they must fit together perfectly within a cross-section exactly one inch in diameter.

To design a rope of this type involved considerably more than merely fitting the required number of wires into a small space. Each outside wire must be solidly supported to avoid crushing on the drum. Each strand must be a tight yet flexible unit to withstand pressure and bending as it moves over sheaves. The center rope must be of the right lay and size to enable each strand to function properly as a part of the rope. And each of these factors must be tempered by a knowledge of probable drum and sheave sizes, operating loads and running speeds of a shovel.

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FOUNDED EXCAVATING ENGINEER 1905

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LOOKING AHEAD

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Colorado River Aqueduct

A review of the excavation and construction required to complete the 392 miles of hard rock tunnels, lined canals and covered conduit included in this Metropolitan Water District project.

Nickel Mining

The surface orebody at the Frood Mine of the International Nickel Company makes it one of the very few shovel operations of its kind in the world.

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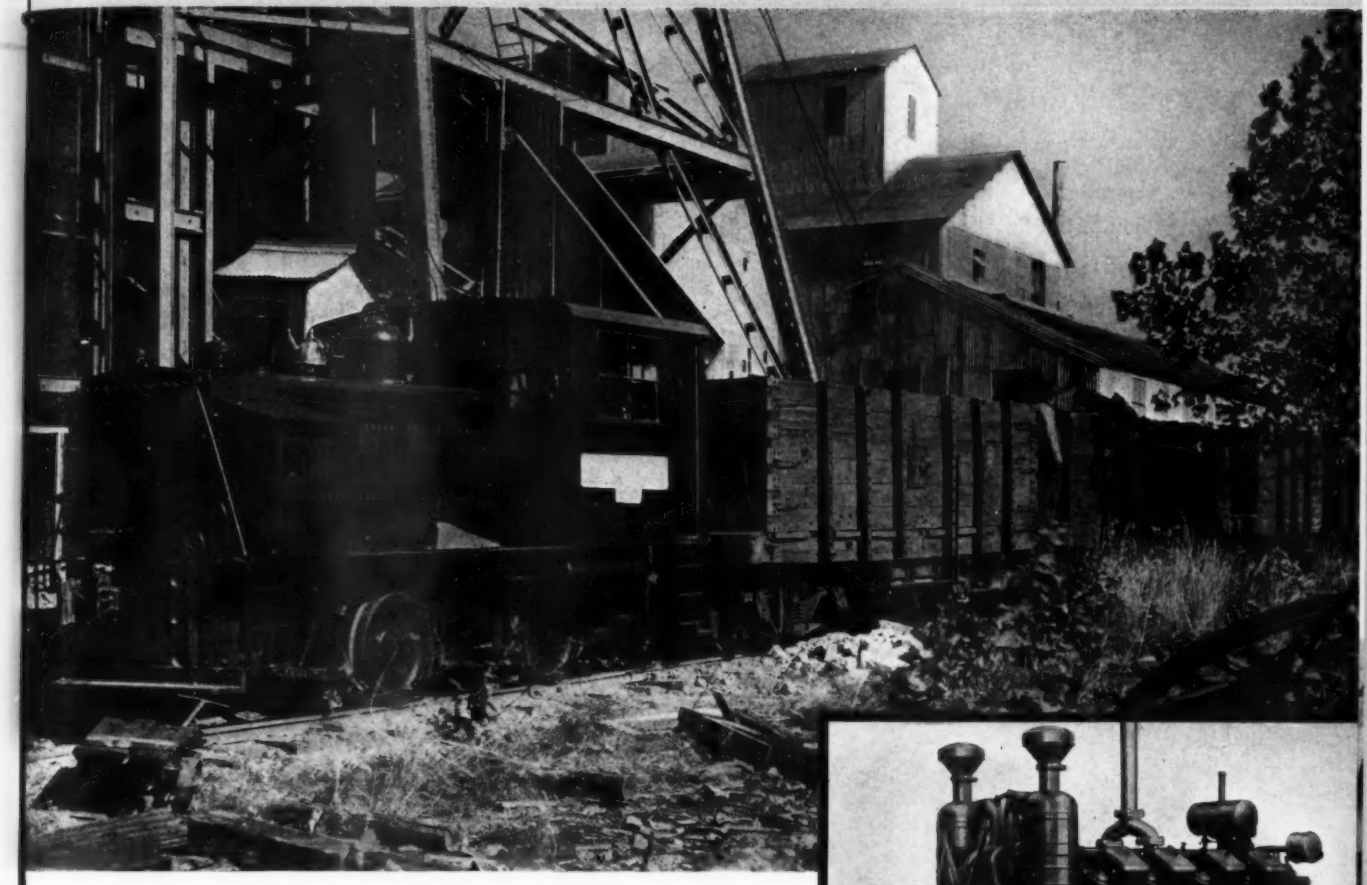

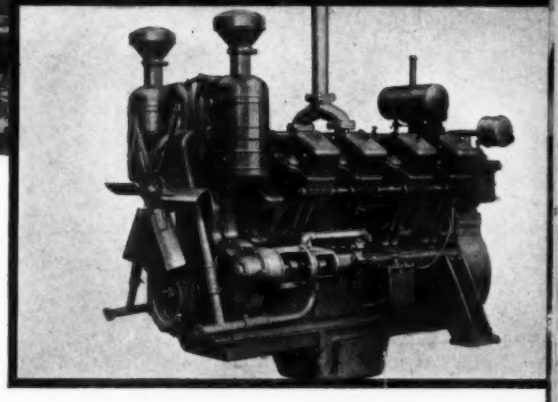

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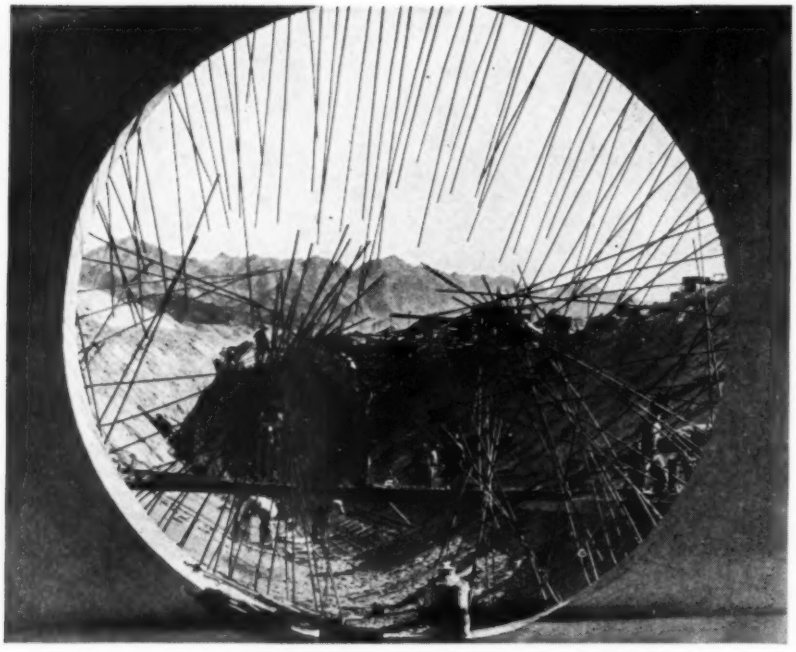
Complete First Siphon On Gila Canal Project



● Construction's end—the siphon as seen from within the closed transition section of the inlet structure. The remaining portion of the barrel was poured soon after this picture was taken.

BY J. C. COYLE

THE FIRST of three monolithic concrete siphons included in the plans for ultimate development of the Gravity Main Canal, on the Gila Project in Arizona, has been completed where the canal crosses the dry channel of the Gila River near Yuma. This siphon, which will carry the water of the present initial canal under the river, is nineteen feet six inches in diameter and 2,000 feet long, with inlet and outlet structures each 60 feet long, including closed transitions and sloping left wing walls. The right wing walls are vertical, and will connect with future construction. The inlet includes a gate section with fixed wheel gate and hoist mechanism. The siphon will carry water of the initial canal, which is 22 feet wide at the bottom and will contain 13½ feet of water. Canal embankments adjacent to the crossing are being prepared to 100 foot width for final development of the main canal.

Final development planned for the project includes an additional tunnel beside each of the two tunnels through which the canal crosses the Laguna Mountains; two more similar siphons to be constructed beside the one mentioned above; and similar tunnels across the Laguna Wash. Also included are tunnels about 2 miles long through the Gila Mountain Range and canal with structures, pump lifts, etc., to lift the water about 450 feet and carry it up the valley of the Gila River which has no surface flow. An area of about

600,000 acres is included in the plan.

Awarded the job for $337,375.50, the Metropolitan Construction Company started work on the siphon just completed on March 2, 1938. Operations were suspended for four months during hot weather, but the contract was completed during January, 1939. Although the hidden flow of the Gila was considered a bugbear by other bidders, three Byron-Jackson single stage, high head, pumps kept seepage water under control. Seven 22-inch wells, 100 feet deep and about 50 feet downstream from the center line of the siphon, were used in de-watering and the pumps were moved along as the work progressed. The water table was materially lowered by farmers up the river and in the adjacent South Gila Valley, pumping for irrigation. When they were particularly active only two of the Byron-Jackson pumps were needed at the job.

Main Channel Not Begun Until October

The siphon and structures contain 11,600 cubic yards of concrete and 2,448,000 pounds of reinforcing bars. Total excavation involved was 183,150 cubic yards (including 40,100 yards for canal) and all but about 850 cubic yards was common river sand. Included in the contract were 106,000 cubic yards of compacted embankment; 19,400 cubic yards of compacted lining; 62,500 cubic yards of backfill over the siphon barrel; 30,000 cubic yards of backfill over the structure; 2,700 cubic yards of compacted backfill; 43,900 cubic yards of rock fill about the siphon barrel and 25,100 cubic yards of riprap on the outside embankment slopes. There were also 1,768,500 pounds of steel sheet piling and minor items of installation.

The spring working period was devoted to excavation at both inlet and outlet ends, construction of the outlet structure and 300 feet of the barrel joining it, and adjacent compacted fills and embankments. The main river channel was not disturbed until work was resumed in October, because of the possibility of summer flood water.

Excavation for the siphon barrel was from 25 to 35 feet deep, and about 80 feet across the top. Much of the loose sand was pushed aside with two RD8 Caterpillars equipped with LeTourneau bulldozers and the remainder was cast direct with a 2-yard Koehring dragline operated alternately on both banks. Most of the spoil, however, was cast upstream, on the left bank, as protection from possible flood water. A working road along the right bank was sprinkled daily by tank trucks and maintained regularly.

Crossing the river bottom below the outlet, the canal channel

● A general view of the siphon under construction. This picture shows clearly the close coordination. Steel work, newly poured concrete and rock fill are all visible.

● Double spotting was resorted to in the quarry where the Bucyrus-Erie 20-B loaded the trucks with rock for the fill around the barrel.

was excavated to 24 inches below grade and wide enough for the ultimate 100 foot canal and compacted lining. Part of this excavation, including toe trenches for the lining, had been done under a previous contract.

Pre-Water Borrow Pits

Extensive borrow pits in the river breaks nearby were prewatered with sprinklers and water pumped from the wells, to a depth of several feet. This speeded up loading, saved shovel teeth — which otherwise would have worn excessively in the hard gravel, and put nearly enough moisture in the material for compaction. It was loaded into 6 and 7-yard Mack and Autocar trucks with a 2-yard shovel and carried to the canal where it was dumped in windrows on the canal bottom. Here, bulldozers spread it in layers which would not exceed 6 inches in thickness when compacted. Compacting was done with sheepsfoot rollers which were pulled over each layer until the grade was reached.

At the same time, the banks were stripped of unsuitable material with the bulldozers, as far as station 791+65, and were furrowed with a plow. A compacted embankment, with a 2 to 1 slope and 50-foot top width was built to 6 feet above the water line on the left of the canal, with the outside slope riprapped at a 3 to 1 slope to a 3-foot thickness at the top edge. A similar embankment with a 30-foot top width, including riprap, was built on the right bank.

Adjacent to the outlet structure a loose fill was placed inside the right bank, bringing it in to the limits of the initial 22-foot channel. From station 791+65 to station 795+00 the embankments were uncompacted, but a compacted lining 8 feet thick at the top, was placed on the inside slopes, bringing them from a 1½ to 1 to a 2 to 1 slope with a top width of 50 feet on the left and 30 feet on the right side. Riprap was extended on the outside slope of the left embankment.

Open Quarry In Granite Ridges to Obtain Riprap

To secure rock for riprap on these and other embankments, and for rock fill about the siphon barrel, J. B. Stringfellow, subcontractor, opened a quarry in some low granite ridges through which the canal passes after crossing the river. Using three Ingersoll-Rand 49 jackhammers with Crusca and Timken bits the ridges were drilled in lifts, to a maximum depth of 24 feet. Holes were spaced about 14 feet apart.

Hercules explosives were used, the holes being sprung three times, as a rule, before the final loading. (For this purpose the powder man prefers "free flow" bag powder when available.) However, sticks were used mostly in chambering, placing about 6, 25 and 75 to 100 sticks respectively in each succeeding spring. After blowing out the holes they were finally loaded with about 4 boxes of Hercules black blasting powder to the deeper ones in the hardest rock. Tamping dirt was carefully screened, especially when loading to spring.

Openings in the seamy granite gave some trouble, especially in secondary blasting. Drillers were instructed to inform the powder man of any such spots through which the drills passed so they might be built up with sand and thus save explosive. A Hercules blasting machine was used on the blasts which were necessarily

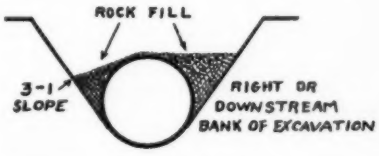
small, with 2,500 to 3,000 cubic yards being moved with 50 holes fired. Large boulders were broken up with one or more pot shots, as the rock had to be under ½-yard in size—and over 1/10 cubic foot. Air was furnished by a Sullivan portable type compressor.

Purchase 20-B for Rock Job

J. B. Stringfellow's two 10-B shovels used on a contract at Imperial Dam still being busy, a Bucyrus-Erie 20-B was purchased for the new rock job. Rock was loaded into a Chevrolet and three G.M.C. dump trucks. At the fills an Allis-Chalmers tractor, equipped with bulldozer furnished by the Crook Company leveled off the rock as dumped. Riprap was not hand placed but dumped and roughly leveled.

All equipment owned by Mr. Stringfellow has been adapted to burn butane, securing more power and speed at lower cost, according to contractors using it at Yuma.

A rock fill was placed about the siphon barrel from canal station 765+30 to 783+80. It has a slope of 3 to 1 on the left and is flush with the siphon top, except



adjacent to the inlet structure, where 4 feet of rock covers the barrel. At each end of the fill the riprap on the adjoining canal embankments slopes down to connect with it.

Riprap was also placed on the outside slope of an embankment on the right of the ultimate canal excavation adjacent to the inlet structure. This embankment has a top width of 30 feet and inside slope of 1½ to 1. The outer slope is 2 to 1 and the riprap 3 to 1. Riprap is 3 feet thick at the top edge.

On the inside slope there is a compacted lining 8 feet thick at the top, with 2 to 1 slope. A loose fill was placed inside it to bring the bank out to the 22-foot canal limit. A riprapped uncompacted embankment extends upstream from the section described, and has a similar compacted lining. Natural earth forms the left bank of the canal adjacent to the inlet.

Unusual Coordination Marks Entire Job

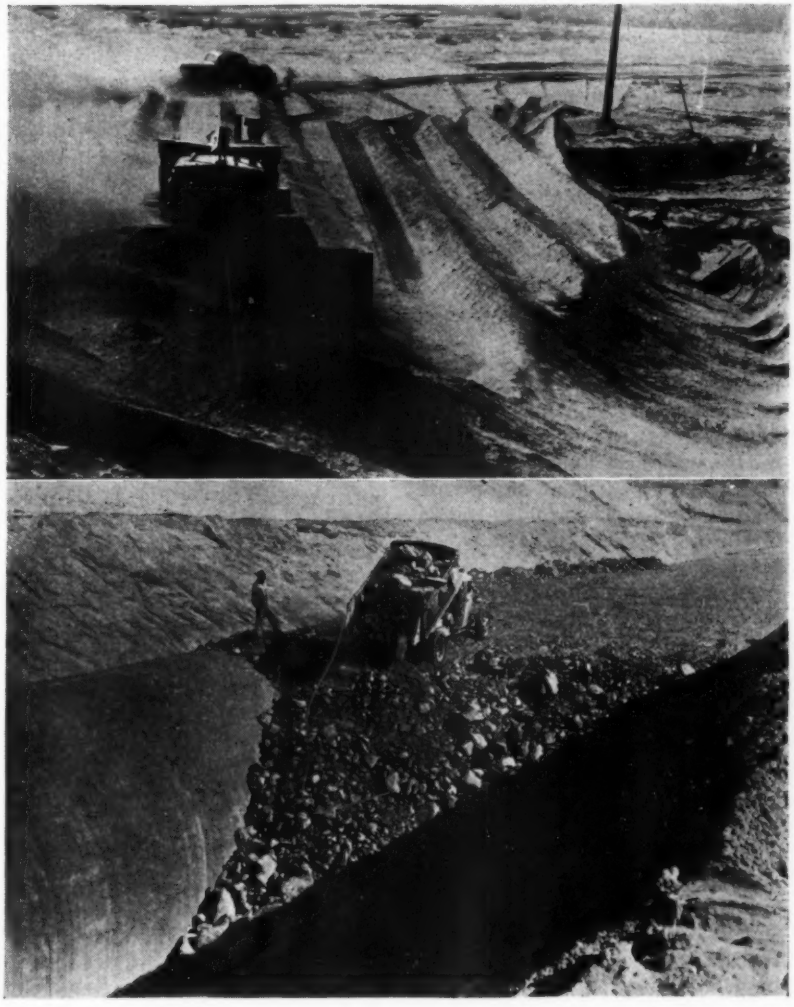
Two 8-hour shifts were worked. The morning shift set steel, excavated and did various other work, and the evening shift which came on late in the afternoon poured the concrete.

Unusual coordination marked the work of the contractor on this job. The dragline, in excavating the channel kept just far enough ahead of the steel work so that no time was lost by embankment cave-ins. The form crew kept right on the heels of the steel men and a 30-foot section of barrel was poured during each evening shift.

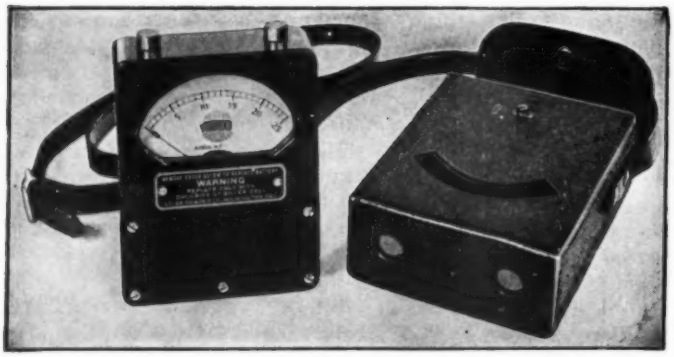
The trucks made the rock fill about the barrel as fast as the concrete was cured and the tractors pushed the common backfill over the top of the barrel close behind.

Jumbo type steel forms, previously used by the firm on the Colorado River Aqueduct, were used on the barrel. Two inner sections, each 30 feet long, and one outside section of the same length, were used in pouring 30 linear feet of barrel daily. A line of 20-foot sheet steel piling was driven at each side of the subbase, which was then shaped by hand and compacted with Ingersoll-Rand tampers. Compressed

(*Continued on page 172*)



● **Top: Pushing backfill over the siphon barrel with a bulldozer equipped Caterpillar RD-8. Bottom: One of the Stringfellow trucks dumping rock fill around the barrel.**



● Illustrated here is a latest model waterproof Galvanometer. It is designed to take hard knocks and will be particularly advantageous to blasters in large shafts, tunnels, etc., where water conditons are extreme. Special features of this tester are the separate compartment which makes it possible to replace the silver chloride cell without exposing the mechanism and the leather case that exposes the contact points without requiring the operator to unbutton the flap.

The Blasting Galvanometer

BY P. C. ZIEMKE

OCCASIONALLY evidence comes to light indicating that firms and individuals using electricity to ignite explosives are still unaware of the old adage that one pays for equipment whether one has it or not. Meaning thereby that loss of production and profits through delays, misfires and accidents mount into large sums, due to lack of some vital piece of equipment. One of these pieces of equipment is the galvanometer used by the blaster, and which is as vital to him in his work as a transit or level is to the engineer.

Directions for Using Blasting Galvanometers

The purpose of a galvanometer is to enable the user to know whether a blasting circuit is opened or closed and if closed whether the circuit is in proper condition for firing. Also to detect ground leakage due to faulty insulating materials or bare joints in contact with wet earth, pipe or rail lines. The galvanometer may be used in testing individual caps and also groups of caps or detonators wired up ready for firing.

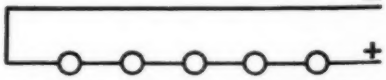
Before testing a circuit, the galvanometer should be checked to see if the cell is in good condition. This test can be accomplished by placing a short piece of copper across the two binding posts of the instrument. Under this test the needle should swing clear across the scale. If the needle does not move at all the cell is dead. If it goes only partially across the scale the cell is nearly exhausted and should be replaced.

To renew the cell, it is only necessary to slip the instrument from the leather case and take out the four screws which hold the top of the instrument case in place. The cell can then be picked out of its holding clips, the terminal nuts loosened and the leads taken off. The new cell can readily be installed, making certain that the positive and negative poles are connected to the lead wires of corresponding marking. Connections should always be tight, otherwise readings will not be correct.

Cells may be purchased from The Chloride of Silver Dry Cell Battery Company of Baltimore, Md., or from the manufacturers of the galvanometer. Use no other type of cell in this galvanometer.

The chloride of silver cell has been selected after many years of experimental work as the proper one for blasting work. The use of other types of cells may cause sufficiently strong current to go through a blasting cap to fire it,

● The Straight Series is recommended for use with blasting machines and can be used when current from light and power lines is available. Current requirements are 1.5 amperes per series with 2 volts provided per cap. Ease of connecting and checking this circuit with the Galvanometer makes it popular for blasts of moderate size.



a. STRAIGHT SERIES

as was the case on a Wisconsin job where a pen light dry cell was substituted. In this case the cap under test exploded, severing the blaster's hand.

This type of cell also has the characteristic of giving practically full voltage until exhausted, when the voltage drops suddenly. For this reason no method of adjusting battery voltage is required as would be the case if other types of cells were used.

Method of Operation

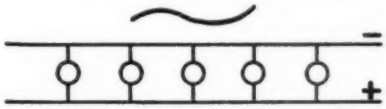
To test the circuit of a blasting cap the ends of the lead wires should be applied to the binding posts of the galvanometer. If the circuit is closed the needle will move up the scale. If the needle does not move it means that there is an open circuit and an investigation of the cap and wiring should be made.

To test for ground leakage, one can drop a drill steel in a water-filled drill hole and use it for a ground rod or use a rod driven in moist earth. The galvanometer in series with the ground rod and the connected cap circuits will indicate the leakage present.

Should the ground leakage reading exceed or equal the reading taken through the cap circuit alone, a misfire is sure to result since electricity always seeks the shortest path to return to its source of supply.

To test the condition of a group of caps connected together in series ready for firing, first calculate the total resistance of the caps and add to it the resistance of the lead wires used. The resistance of caps may be obtained from tables issued by the explosives manufacturers. Copper lead wire resistance is as follows:

● **The Straight Parallel is a popular method of connecting caps when power or light current is available. It is recommended that the current supply be free from ground to prevent leakage of current in wet work and that not less than 0.5 ampere be used.**



b. STRAIGHT PARALLEL

● **The Galvanometer as it appears in its leather case. The case is made in such a way that the movement of the pointer can be seen without removing the instrument. The current supplied by this instrument is by no means hazardous as it is less than one-tenth the strength required to detonate a cap.**

RESISTANCE OF COPPER LEAD WIRE IN OHMS PER 1000 FEET:

No. 8	Brown & Sharpe gauge.....	.6271 Ohms
No. 10	Brown & Sharpe gauge.....	.9972 Ohms
No. 12	Brown & Sharpe gauge.....	1.586 Ohms
No. 14	Brown & Sharpe gauge.....	2.521 Ohms
No. 16	Brown & Sharpe gauge.....	4.009 Ohms
No. 18	Brown & Sharpe gauge.....	6.374 Ohms
No. 20	Brown & Sharpe gauge.....	10.14 Ohms
No. 21	Brown & Sharpe gauge.....	12.78 Ohms
No. 22	Brown & Sharpe gauge.....	16.12 Ohms

For example, if 30 blasting caps were used together with 100 feet No. 20 connecting wire and 500 feet No. 16 leading wire the total resistance of the circuit should be as follows:

Assuming the caps in question have a resistance of 2 ohms as given in the manufacturers' table, then:

30 caps have resistance of.....	60 Ohms
100 ft. No. 20 wire have a resistance of..	1 Ohm
500 ft. No. 16 wire have a resistance of..	2 Ohms
Total resistance of circuit is.....	63 Ohms

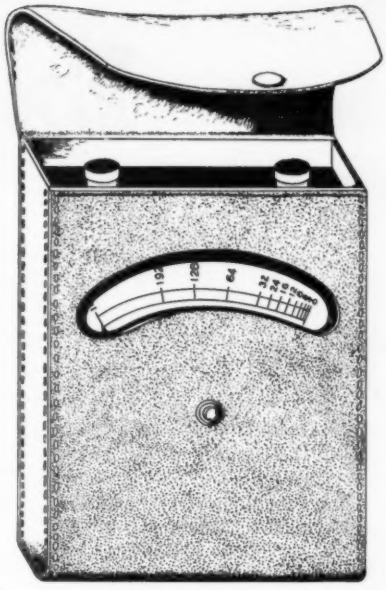
With the galvanometer applied to the ends of the circuit, the needle should indicate approximately 63 ohms.

In circuits where the caps are connected in parallel each cap must be tested separately. In circuits where parallel-series arrangement is used the circuit must be separated into individual groups and each series tested by itself.

To locate a break in a series of caps, separate the ends of the lead wires and check the resistance of each group of caps until the open one is discovered.

Care of the Galvanometer

The Blasting Galvanometer is made as rugged as it is possible to make a small sensitive instrument, but at the same time it must be handled with reasonable care. It should not be allowed to rest with the terminals lying against a conductor as this obviously will soon run down the cell. The length of time that the cell will be usable depends on how frequently the instrument is used and how long the current is permitted to flow in making each test. If properly used, one cell is sufficient for several thousand tests. The instrument should be stored in a

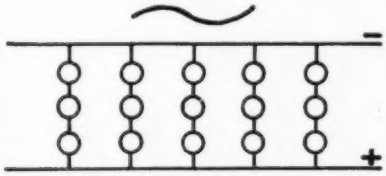


dry place and never allowed to lie around in puddles, mud or wet places.

If an accident occurs to the galvanometer so that the needle no longer swings freely, the galvanometer should be returned to the manufacturer. With the instrument should be a letter authorizing the repairs to be made. The user should not attempt to make repairs on these instruments any more than he would to his watch.

An inaccurate watch is practically useless and obviously misleading; so, too, is the galvanometer in poor state of repair. The only exception to the above rule being that compensation or allowances must be made for a partially exhausted cell.

● **Two advantages of the Series Parallel are that each series can be readily checked with the Galvanometer when the wiring is subject to abuse and the current requirements are comparatively small even on large blasts. Recommended current requirements are 2 amperes per series with two volts provided per cap.**



c. SERIES - PARALLEL

Excavating For A

BY L. H. HOUCK

ROAD building in Florida is a Joseph's coat of many problems. Many roads are built over vast marshes and swamps where draglines fight water and cypress roots. Down in the Everglades road builders fought water hyacinths while they groped in the dark for something solid to put the road on. In other places dry sand and tropical heat hampered the orderly process of laying today's Bagdad carpets.

But the road builder, whether its hard rock in the mountains or muck in the lowlands, knows not defeat. Where specifications call for road—he builds road.

The Geo. D. Auchter Co., of Jacksonville, Fla., one of the pioneer construction firms of the south, has had wide experience in road and excavating work. At present the company is working on several road contracts in different parts of the state.

Dry Today — Full of Water Tomorrow

One of the most interesting jobs is a contract near Haines City, Florida, where I. W. Schumaker is superintendent. Mr. Schumaker is no newcomer to Florida road building and has had more than one tilt with sands that shift with the wind, with water that bubbles up from hidden underground springs, and holes that are dry today and full of water and fish the next morning.

He has fought water with everything from dragline buckets to centrifugal pumps, only to move to another job where if he only had a bucketful of water he could hold the sands long enough for the surveyor to sight for grade.

The Haines City job is one of those clean and interesting jobs with just enough problems to go around. Up to the time this was written it was a dry job, a job where a 24-foot deep underpass was being dug with a dragline in a normally wet country and yet dry as the Sahara at the bottom. All this where a good rain would mean at least twenty feet of water in the hole.

Before digging the underpass they used the dragline to excavate 3,000 feet of deep ditch for a storm sewer and managed to do the excavating and lay the pipe without encountering a water problem. All this is a paradox in a country where it is not unusual for a farmer to drive a ten-foot pipe in the ground in his back-

Top: The excavation under the tracks looked like this. Note the size of the man in comparison to the depth of the hole. Bottom: Looking up at the 22-B perched on the bank.

As the job looked from on the tracks. This pict shows the dry, loose ma terial in which the w was done.

Florida Underpass

yard, screw a pitcher pump on the end and have a well of usable water.

To start the Haines City job off right the Auchter Company bought a new Bucyrus-Erie 22-B dragline which was delivered to the job. It was equipped with a ¾-yard bucket and a 40-foot boom.

As soon as the dragline was unloaded and ready to work Mr. Schumaker, superintendent, had a clamshell bucket put on and started digging the 3,000-foot long ditch. Part of the ditch was 22 feet deep and the maneuverability of the entire machine combined with the long reach, made possible with the 40-foot boom, proved very valuable in moving the dry, slippery material.

Underpass Six Tracks of Atlantic Coast Line Railroad

The ditch was started at six-feet wide at the top and then narrowed down to three feet in width at the bottom. Under the direction of Mr. Schumaker the work went along without a hitch and the storm sewer was laid in record time. The sewer pipe was 18-inch concrete for the entire length except for the part going under the railroad which was cast iron pipe. The dragline dug the ditch, helped lay the pipe and then refilled the ditch before it was ready to get busy digging the underpass under the tracks for the Atlantic Coast Line railroad.

For the underpass work a ¾-yard dragline bucket was used and dirt was moved at the rate of 800 yards daily. The total excavation was estimated at 28,000 yards. Despite the long reach to the 24-foot bottom in some places, the 22-B kept the ten Chevrolet dump trucks busy hauling away the dirt which was being used on another job. This second job to which the dirt was hauled was an overpass on another highway job a mile and a half away.

Work Is Considerably Ahead of Schedule

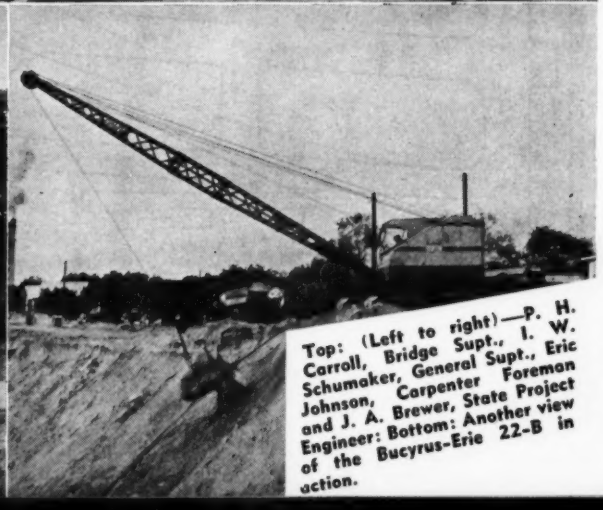
The 22-B, which was purchased especially for this job, is powered with a Wisconsin 6-cylinder gasoline engine, and is mounted on caterpillar type treads. As a spare time job it was also used for handling the steel I beams used for the new railroad bridge over the underpass.

Skilled employees on the job are from the regular staff of the Geo. D. Auchter Co., while the common labor comes from the National Employment Office. The work is considerably ahead of schedule, Superintendent Schumaker said.

J. A. Brewer is state project engineer, P. H. Carroll is bridge superintendent and Eric Johnson is carpenter foreman.

The highway under construction in this instance is to have two 13½ foot strips of concrete with curbs and gutters, separated by a 10-foot strip of lime rock with an asphalt top.

...from ...is pict... ...pose ... ...the ... ...the right can be seen ... partially filled ditch ...ch was dug with the ...shell bucket.



Top: (Left to right)—P. H. Carroll, Bridge Supt., I. W. Schumaker, General Supt., Eric Johnson, Carpenter Foreman and J. A. Brewer, State Project Engineer: Bottom: Another view of the Bucyrus-Erie 22-B in action.

New Los Angeles Airport Attracts Wide Attention

Most of the major airlines are expected to move their Los Angeles headquarters to the new location where five runways permit take-offs in any direction.

BY JOHN R. MARCY

THE BUILDING of the new Mines Field, or Los Angeles Municipal Airport, has attracted wide attention not only in the field of aviation but from those interested in black-top construction. Even engineers and technical experts from several foreign countries have visited the project from time to time.

When completed the field is expected to be one of the largest airports in the world. It will consist of five principal runways so laid out that take-offs may be made in any direction. Three of these will extend parallel east and west for 4800 feet, the central one being 300 feet wide and those on either side 200 feet. One north-south runway will be 4700 feet long and 300 feet wide, and the fifth will run cornerwise across the others for 5000 feet.

Expect Major Airlines to Move Headquarters

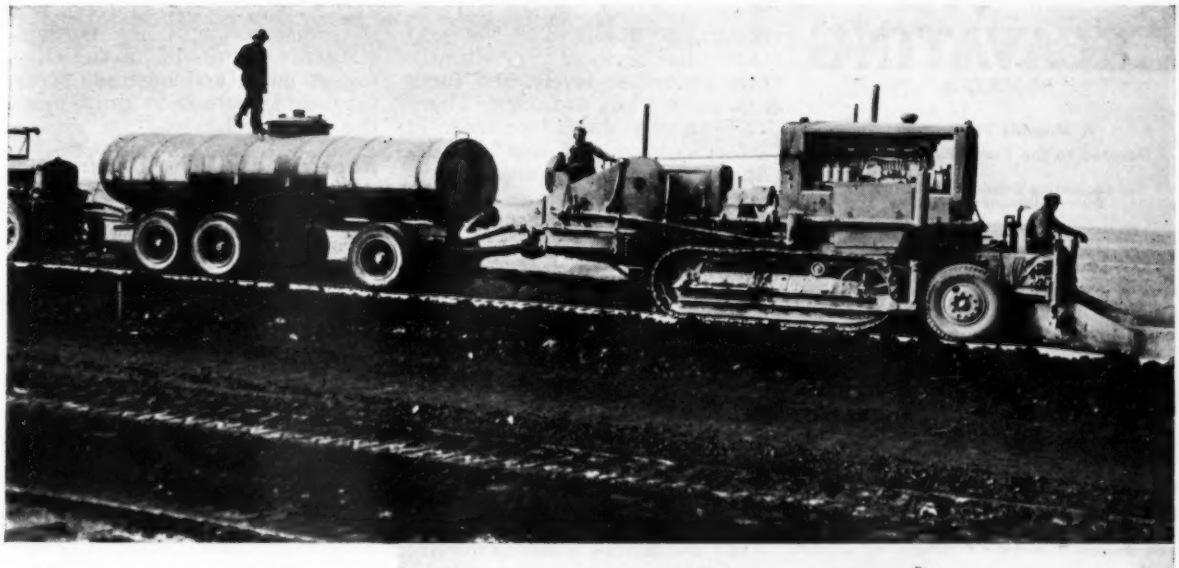
Spanish type administration and passenger terminal buildings and three 480 by 250-foot hangars will be constructed on the north side of the field. Boundary lights around the entire field and flush lights along the runways will be installed.

Most of the major airlines are expected to move their Los Angeles headquarters to the new location when it is completed.

The cost of the entire project is estimated at $3,888,624. Unit No. 1, now under way, is estimated to cost $419,886, of which $248,613 is provided by the WPA and $171,273 by the City of Los Angeles. The city is also supplying funds for the lighting system.

Work was started on the main runway last October. It is a two course black-top construction, the aggregate being a sandy loam obtained from a deposit at the west side of the field.

The base mat will be approximately 4 inches thick, over which a finish coat 2 inches thick will be spread. The soil upon which the runways are laid is adobe, about 80% of which passes a 200 mesh screen. Since this adobe soil will absorb about three times its weight of water, an important



● Top: The Madsen Automatic Feed Pug Mixer in action on one of the runways at the Los Angeles Airport. Below: Rear view of the mixer and tandem sheepsfoot rollers working side by side.

problem was to exclude the penetration of water under the runway. To do this a curtain wall 2 feet deep at the outside and 8 feet wide is being laid at the edges. This wall, which tapers inward, is made of the same material as the base.

Automatic Oil Control Gives Uniform Mix

Aggregate was taken from the deposit and spread over the runways where it was later shaped by a special windrow sizer into uniform windrows of 3¾ cubic feet per running foot. Mixing was done by a Madsen Road Pug, a newly developed machine which was selected for the job after exhaustive tests had been made, and which seems to represent a considerable advance in this type of equipment. Engineers in charge of the work and others who have checked its operation are unanimous in the opinion that the mix is the most thorough and uniform they have ever seen. This is effected by a new type of automatic oil control which regulates the flow of oil according to the rate of travel by gearing the pumps to the track. The amount of oil for a given volume of aggregate is always the same and the resultant mix of uniform proportion.

The mixer is a twin shaft, pug mill type, powered with a Caterpillar Diesel engine and mounted on Caterpillar tracks, designed to produce a road mix with a single pass operation. It has been consistently traveling 20 feet per minute turning out about 270 tons of mix per hour throughout an 8 hour day. Emulsions are supplied by tank trucks which service the pug during operation. All emulsions are furnished by the American Bitumuls Company.

Runway Base Course Exceeds Government Specifications

The stabilized aggregate is spread with graders and compacted with sheepsfoot rollers and tampers. The finished runway base has an absorption of 1% or less of its weight in water, a considerably higher efficiency than is required by the Bureau of Air Commerce specifications.

Bitumuls Stabilizer, consisting of one gallon of bitumuls to 2½ gallons of water, is used in the proportion of 2 gallons of stabilizer to 5 gallons of water per running foot of windrow to accomplish stabilization. This is 4.5 by weight.

Work on the surface course has not yet begun, and tests are still being run to determine the most efficient wearing surface stabilization.

The project is under the direction of Los Angeles City Engineer Lloyd Aldrich and Lt. Col. Donald H. Connolly, Southern California WPA administrator. L. R. Mason is project engineer, and W. R. Walker job superintendent for the city. Mixing is being done by the Warren-Southwest Company of Los Angeles.

EXCAVATING ENGINEER

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Devoted to the Excavating Industry

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Greater Business and Construction Expected During 1939

Business activity, as measured by the volume of industrial production, did not continue in January the vigorous advance that began in June, 1938, but this is not astonishing, nor should it be discouraging according to dependable business activity publications including the Cleveland Trust Company Business Bulletin. We had from May through December, seven months of consecutive business improvement, which is most unusual. The increase recorded during that time is perhaps the greatest advance in production that has ever been recorded in a seven month period.

Preliminary figures for January business do include several encouraging items. The National Income has declined very slightly from December levels, and farm cash income has advanced. There has been only a small decrease in factory employment, and little decline in factory pay rolls. Department store sales volume has held up well and there has been a small decrease in living expenses. Security prices, which fell rather sharply when uneasiness about the European situation was at its height, have been staging a strong recovery.

Taking into consideration all the diverse factors in business activity, it is reasonable to believe that not only will the business gains attained thus far be retained, but new advances during the year can be expected.

The residential building volume will continue to rise during 1939, according to the F. W. Dodge Corporation, which estimates a volume of $3,500,000,000 in construction contracts for 1939 as compared with an estimated $3,200,000,000 for 1938 and an actual total of $2,900,000,000 for 1937. These estimates are for the 37 eastern states only. It is also estimated that between 240,000 and 250,000 dwelling units will be built in 1939 as compared with an estimated 215,000 for 1938.

A recent survey in 212 cities by the National Association of Real Estate Boards reveals that 66% of the cities anticipate a greater volume of home building while 21% expect increased volume in the construction of new business structures. Only 4% of the cities expect home and business structure construction to drop below the 1938 level.

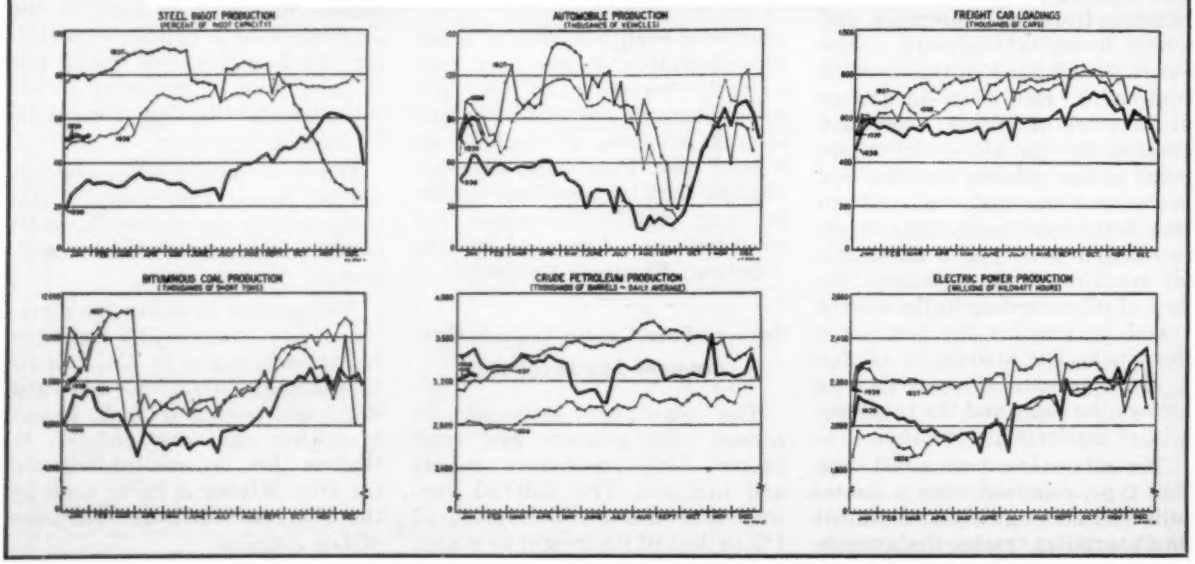
Reprints of "Who Determines the Wages of Employees?"

Reprints of the article on the following page are available for you. Just tell us how many you want and send us one cent for each copy. Excavating Engineer is publishing 12 articles adapted from Bulletins issued by the S. D. Warren Company. "Who Determines the Wages of Employees?" is the eighth in the series.

You can get reprints of any individual article, or of the entire series. If you want, say, 25 copies of one article, tell us the name and send 25 cents. If you want 10 copies of each reprint in the series, send us $1.20. We'll send you copies of those already published, and follow with the others as they are issued. The price is one cent for each copy, and 10 copies of any one reprint is the smallest order we can handle.

These articles are being published because Excavating Engineer believes they give an extremely clear picture of the American Business System. The reprints are offered to you in case you care to distribute them to employees or friends. Orders for reprints should be addressed to Excavating Engineer, South Milwaukee, Wisconsin.

WEEKLY BUSINESS INDICATORS



WHO Determines The Wages *Of Employees?*

THE WAGES of American workers are not controlled nor determined by the managers of businesses. Managers of businesses have little influence on wages. When the managers of businesses make their budgets, they estimate wage rates and estimate the amount of money they will spend for wages during the year. They base their estimates on the wage rates that are generally paid within their industries and in other industries in the same locality, but they cannot *determine* the wage rates and they have very little control over the factors that determine what *real wages* will be paid.

If the research department in a business can invent or find new machinery or new materials that reduce the costs of producing finished products, the management of the business can increase the wages of the employees and, to that extent, the management of business can influence real wages. American business has influenced wages considerably in the past fifty years by developing machines, methods and materials that lowered costs and thus made it possible to reduce prices and increase wages. Wage increases secured by this method were not secured overnight, because research and invention take time and the benefits from them are secured little by little. But when they are secured, they can be kept.

There is no other method for achieving permanent increases in the real wages of groups of workers. Other methods only produce temporary advantages which are inevitably followed by disadvantages.

If a contractor elects to raise the wages of his employees above the scale paid by his efficient competitors, he will automatically increase his costs above his competitors' costs. Trouble of one kind or another will follow. If the contractor raises his prices to take care of the wage increase, he will lose his business to his competitors and will be unable to keep his organization running. He will be forced to reduce operations from six days to five, to four, to three—and, eventually, to close up altogether. Thus the employees who are paid a high wage scale will receive a continuously shrinking weekly wage and, finally, no wages at all.

If the contractor elects to figure his prices on approximately the same basis as his competitor and to pay the increased wages out of the company's savings, he will be able to continue only as long as the savings last. When the savings are gone, the weakened business will fail and the employees will be out of jobs.

If all of the businesses within an industry raise wages simultaneously and all of them increase their prices accordingly, trouble will follow because people in other industries, who haven't received wage increases, will decide they cannot afford to pay the increased price and will stop buying. If the beef packers should raise wages and prices, people would cut down on the use of beef and buy lamb; if all of the meat packers should raise wages and prices, people would cut down on meat and buy fish. So a general wage increase in one industry causes a shrinkage of orders and thereby reduces the hours of work or reduces the number of jobs. Under these conditions workers receive a high wage rate but get very little money.

An example of the effect of high wages within one industry can be observed in the automobile industry. In 1937 high wage costs forced increases in the price of automobiles. Simultaneously, general business fell off. Workers in other industries went on short time and decided that they couldn't afford to buy automobiles at the high price, so they stopped buying. On January 29, 1938, the United Automobile Workers reported that 320,000 automobile workers were out of jobs and the remaining 197,000 were working part time. So the automobile workers enjoy a high wage *rate*, but receive *very little money or no money at all.*

What if wages were raised in all industries at the same time? Well, millions of farm people would be unable to pay the increased prices of manufactured goods and would stop buying. Orders and working hours in industries would shrink and actual dollars received by workers would be less than they received before they got the raises.

If all industrial workers and all farm workers should get raises at the same time, everybody ought to be happy about the whole thing. But in that case all prices would go up and the increased weekly wage would buy only as much as it bought before and no more. Wage rates would be higher but real wages or buying power would not be changed.

Real wages are determined and set by the mass buying actions of the people of the United States. Workers in different industries and on farms stop buying when the price of a product of one industry gets too high in relation to the wages paid in other industries. When they stop buying the products of a particular industry, they force the workers in that industry to accept a reduced wage in the form of a lower wage rate or a lower total weekly wage.

No business man or group of men can control the buying actions of 130 million people and so no business man can control the factors which determine real wages.

What About Business?

ALTHOUGH Excavating Engineer does not entirely agree with Mr. Frost's opinions as expressed in the letter below, we believe his point of view is sufficiently thought-provoking to be worth passing along.

Several points should be raised in defense of the editorial "Who Owns Business?" which Mr. Frost, a director of Dell Hydro-Power Corp., Buffalo, uses as the springboard for his economic comments. First, this is one of a series of articles explaining the American system of business. As such, it must inevitably draw many individual pictures which lend themselves to the "so what" criticism. It is the relating of statements like "When Harm Comes to big business in America, everybody suffers" to the entire economic picture which is significant.

In the paragraph regarding "more money for the banks to lend out," to which Mr. Frost takes exception, it should be remembered that the editorial assumed, and stated in the same paragraph, that business was good—in which case there *would* be a demand for money from the banks, which does not now exist.

Without agreeing with Mr. Frost as to the importance of the role the Federal Reserve requirements have played in our business cycles, it is our belief that no single group is sufficiently intelligent to plan properly to avoid our economic problems and that, in the long run, prosperity must depend on the mental attitude of the people as a whole.

But here is Mr. Frost's letter. We'd be glad to have any comments you care to make.

Dear Sir:

In glancing thru your magazine which reaches this office every month; I read your editorial "Who Owns Business?", published in the December 1938 issue, and it occurred to me that it was pretty weak stuff. You state in the last paragraph: "When harm comes to big business in America, everybody in America suffers." So What?

Your article reminded me very much of telling a man who is suffering from cancer that he must be a pretty sick man.

Why not get at the foundation of the trouble instead of dishing out a lot of moth worn information?

In 1919 and 1920 the Federal Reserve caused the rediscount rate on Federal Land Banks to rise from 3% to 7%, and in 1920-21 we experienced a severe depression as a result. In 1928 and 1929 the Federal Reserve raised bank reserve requirements twice within the same year, and siphoned $7-billion of credit out of existence. A depression resulted. On July 14, 1936, the Federal Reserve raised bank reserve requirements 50% effective August 15, and on January 30, 1937, they again raised bank reserves another 50% effective March 1, and May 1, removing another $3-billion out of circulation. This planned action immediately percipitated the recent "recession".

Yet each time the Government has poured a few billion dollars of extra money into circulation, we have had a revival of business activity. When are we going to learn that money--interest free money--is what we need?

Sure there's $3½-billion of idle money in the banks, but this company (along with thousands of others) refuses to borrow one penny to expand our sales, or our payrolls, our inventories, or our capital structure. BECAUSE WE KNOW THAT TO DO SO WOULD NOT INCREASE OUR INCOME 1% IN A YEAR.

Let's take a look at the real facts underlying this present situation.

The U. S. Department of Labor maintains--among many other things--a statistical bureau, which indicates that the average price of all raw material commodities (wholesale) was 100 for the period of 1925 to 1927. By that we mean that the raw material producers (and there are 55,000,000 in the U. S. including 35,000,000 farmers) obtained $1.50 a bushel for their wheat, $10.00 a ton for their cabbage, 55¢ a pound for beef, etcetera, etcetera. During that period of time there were 700,000 unemployed in this country.

In 1933 our commodity index had dropped to 56, meaning that the raw material producers received 44% less for their products, or in other words that their income was 44% less. Unemployment was gauged at 8,000,000. Homes and farms were being confiscated at the rate of 3000 a day.

Just as soon as the Federal Government began to put money into circulation (albeit it was borrowed and would eventually act as a boomerang) our raw material index increased to 88 in the early spring of 1937. In other words the income of the raw material producers was increased from 56 to 88 or 55%. The raw material producers had 55% more money to spend for the products of industry, and factories all over the country geared themselves up to produce not only the additional things that the raw material producers were then able to buy with this extra money, but also to sell finished goods to the several hundred thousand additional white collar and factory workers that found employment as a result. In the fall of 1936 and the spring of 1937 the Federal Reserve entered upon a definite deflationary movement by raising bank reserve requirements. IMMEDIATELY THIS COMPANY INSTITUTED A PROGRAM OF RETRENCHMENT AND WE SO ADVISED OUR EMPLOYEES THE REASON FOR OUR ACTION.

The raw material index dropped from 88 to 77 in six months, and again the income of the raw material producers (55,000,000 of them) was cut 10%. Industry again shut down, reduced payrolls, and cut expenses to the bone, for they--like ourselves--realized that 55,000,000 people were again in a predicament where they would be unable to buy.

In April of 1938 the Government released $1,200,000,000 of sterilized gold into circulation, and again embarked upon a borrowing policy. Our raw material index shot up to 85, and the stock market doubled in dollar value in 90 days.

So what? Just this--when the people of this country, including 642,000 owners of the American Telephone and Telegraph Company, realize that a Board of Governors of the Federal Reserve System sitting in their Washington Offices are directly and arbitrarily responsible for the misery they have suffered during the past ten years, I for one, just don't want to be around.

I quote from your editorial once more. "When folks are working every day and business is good, the majority of families will put something in the bank for a rainy day, and that will mean more money for the banks to lend out to business, which in turn will make more work and more of everything for everybody."

Pretty ridiculous thinking, wouldn't you say? Especially in view of the $3½-billion now lying idle in the banks waiting for someone to borrow? Why do you intimate that there should be "more money for the banks to lend out to business" when we already have more than we can use--or refuse to use because even if we did, it wouldn't improve the status of the 55,000,000 raw material producers, or the 10,000,000 unemployed one iota. Mr. Editor, let's use a little horse sense in this discussion. Industry, at least not this company, does not produce in the "hope" of selling its products, but only to supply a demand that is evident. It's like the question, "Which came first the chicken or the egg?" What comes first, "Inventories, expansion, increased payrolls, or the purchasing power (money in the hands of 65,000,000 people) which sets the wheels of industry in motion to supply that purchasing power with its needs.

Very truly yours,

EF:JF

J. E. Frost

1877

1939

Halbert Frank Riley

The death of Halbert Frank Riley, President of Clapp, Riley & Hall Equipment Company, on January 22, brought to a close a lifetime of service to the excavating and construction industry. His passing takes from us a genial and loyal friend; a wise, courageous and honest co-worker.

"Hal," as he was so widely known, was born March 4, 1877, in Stoney Point, Michigan, and his early life was spent in that locality. He entered railroad construction work when he was about 20 years of age and in 1906 acquired an interest in the firm of Clapp, Norstrom and Riley. This organization was incorporated in 1921 under the name of Clapp, Riley and Hall Equipment Company and from 1922 until his death, Hal Riley served as its president.

Even while handling construction equipment as an associate in the above firm, Hal maintained his interest in construction work and had a part in many construction projects both as a contractor and sub-contractor. Among the projects on which he worked were the construction of the Coast Line of the Chicago, Milwaukee, St. Paul & Pacific Railroad in Montana; Camp Custer at Battle Creek, Michigan, and the Army Supply Base at Norfolk, Virginia, during the war period; the Welland Canal; and extensive contracts for several other railroads including the Pennsylvania and the Northwestern.

Because of his wide personal success on construction work, as well as his experience in equipping and outfitting others for such work, Hal's advice was often sought by contractors all over the country. It is said of him that he visited more construction camps and looked over more dirt-moving jobs than any other man of his day.

In 1907, he was married to Miss Jessie Horn who survives him together with seven children: Theodore, John H., William P., Thomas, H. F. Riley, Jr., Miss Frances Riley and Mrs. H. F. Gould. Also surviving are two sisters, Miss Rose Riley and Mrs. Claudine Clapp.

William P. Riley, third eldest son, will be associated with the Clapp, Riley & Hall Equipment Company.

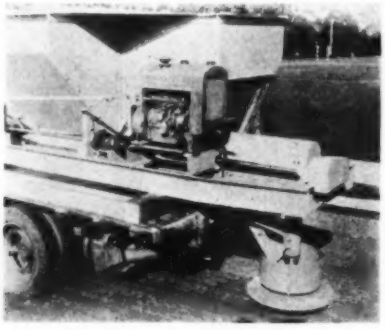
A heart attack at his home in Wilmette, Illinois, was the cause of Hal's death. His passing will be mourned by his countless friends, with whom he will always live in warm memory.

Equipment

you ought to KNOW ABOUT

Powered Sand Spreader

A sand or anti-skid mixture spreader equipped with an independent power supply offers several distinct advantages, it is claimed. The Good Roads Spreader, Model Y-186, manufactured by Good Roads Machinery Corporation, Kennet Square, Pennsylvania, is powered by a 4-cylinder Gasoline Power Unit, manufactured by Hercules Motors Corporation, Canton, Ohio.



The spreader can be mounted on a truck chasis or it may be mounted in a truck body from which it may easily be removed to leave the truck free for other work. It has a 6-yard bin equipped with a large screw conveyor and a spreader of the spinner disc type which will spread a width of 9 to 15 feet. Independent power for the spreader allows positive control of spread at any truck speed. The truck driver can easily control the entire operation from the cab.

Mine and Quarry Trucks

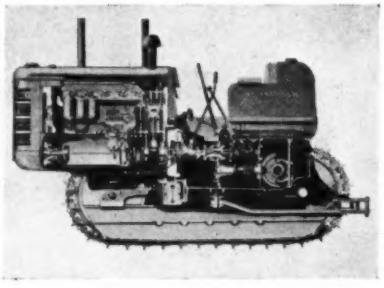
Within the past few months Mack Trucks, Inc., has developed two super duty truck models designed especially for open pit mining, quarry and similar "off the road" operations.

Of the two new models, the FC six-wheeler is rated at 100,000 lbs. gross vehicle weight and has a net payload of 30 tons. As a four wheel truck this model has a gross vehicle rating of 60,000 lbs. and payload capacity of 15 tons. The other model, designated as the FJ, is designed for somewhat smaller capacity and is available only with four wheels. It rates at 45,000 lbs. gross with payload capacity of 11 tons.

The high performance of the latter model makes it particularly suitable for small pits where the grades are steeper or for operations where higher maximum speeds over extended hauls are desirable. All three of these new units are chain driven and can be obtained with either gasoline or diesel power plants.

New TD-18 TracTracTor

The largest and latest in the International crawler-tractor line, the TD-18, has recently been announced. Various construction details of this full Diesel crawler are shown in the cross-section illustrated.



The maximum belt horsepower of the new TD-18 is approximately 80 and maximum drawbar horsepower is 70, both figures being corrected to sea level barometric pressure and temperature of 60 degrees Fahrenheit. As is the case with other International Diesels, the TD-18 starts on gasoline and, after a minute or less of operation, shifts to full Diesel operation. A conventional automotive-type electric starter is regular equipment, and with it the engine is started easily from the seat, regardless of weather.

The tractor has six forward and two reverse speeds, as follows (miles per hour at rated engine speed): Low gear, 1½; second, 2; third, 2½; fourth, 3¼; fifth, 4⅝; high, 5¾; low reverse, 1½; and high reverse, 3¼.

The six-cylinder engine is of four-cycle, full Diesel type, and operates at 1200 revolutions per

minute when developing its maximum horsepower.

Other important features include brake for fast gear shifting; power-actuated steering clutches which make steering unusually easy; adjustable steering levers and pedals to suit operator; full-pressure engine lubrication at all working angles by triple-gear oil pump; special gravity lubrication for track rollers at low speeds and pressure lubrication at high speeds; and quintuple-sealed track rollers to keep out dirt.

The tractor is available in two treads, the narrow tread being 62 inches from center to center of track. The wide-tread tractor is 74 inches from center to center of track. The length of tracks (ground contact) is 84⅝ inches, and track shoes are available in a variety of sizes and types.

Wire Rope Electric Hoist

The Speedway, a light weight low cost wire rope Electric Hoist, has been added to the present line of the Wright Manufacturing Division of the American Chain & Cable Company, Inc., York, Pennsylvania.

Hoisting capacities range from 250 pounds to 750 pounds and hoisting speeds 15 feet to 43 feet per minute. The electric hoist is made in three types for lug suspension, hook suspension or mounted on trolley. Details will be sent on request.

New Dirt Moving Equipment for TD-18 TracTracTor

The outstanding Bucyrus-Erie 2-Wheel and 4-Wheel Scrapers, Bullgraders and Bulldozers are now available in models specially designed to give peak performance with the fast, economical new International TD-18 TracTracTor.

The M-81 4-Wheel Scraper gives big-scraper performance at small-scraper costs, according to the manufacturer. The exclusive Bucyrus-Erie "double-curve" cutting edge heaps the load regularly in all types of scraper material. Economical single cable control lets the operator govern digging, hauling and dumping operations with a single lever, permitting him to spread loads accurately to meet job specifications.

To get dirt from difficult places and put it in difficult places, the H-74 2-Wheel Scraper teams up with the new TD-18. Like the smaller Bucyrus-Erie 2-Wheel Scraper, the H-74 dumps backwards, and behind its wheels, like a truck. This feature is invaluable for building up fill, dumping into water over the end of a bank and also permits stacking the load or bulldozing it level. A simple, low pressure hydraulic system controls the position for digging, hauling and dumping.

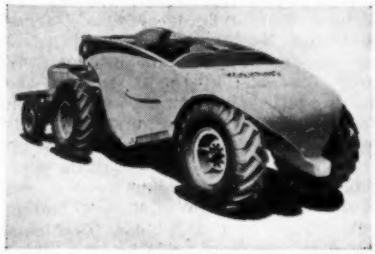
To complete the equipment to pair with the International TD-18, Bucyrus-Erie introduces a larger size Bullgrader and Bulldozer of the same design as the smaller models which have proved so successful in the field. The Bullgrader will sidecast to either side. When the angling adjustment is set for sidecasting, the equipment can move ahead continuously, leaving a smooth, accurate grade, and rolling the dirt off to one side in a windrow. The blade can also be tilted to either side for cutting down banks, ditching, etc.

Speeding up the machine's output was the aim behind the design of the Bulldozer. Compact, clean arrangement gives the operator clear vision. The hydraulic control-valve is placed conveniently, permitting positive and almost instantaneous adjustment of the blade while the tractor is in motion. Like the Bullgrader, the completely balanced Bulldozer prevents the tractor from "nosing in."

Koehring Wheeler

The Koehring Company of Milwaukee announces the release of its latest and newest dirt-moving equipment, the Koehring Wheeler. This unit provides high speed for traveling and plenty of power for faster loading.

For traveling to and from the dump, Koehring uses a rubber



tired tractor, with speeds of 18 to 20 miles per hour, to pull the loaded unit. The width and height are within highway limitations, permitting travel on any highway or city street. It has 21" of clearance in hauling position, yet is flat on the ground for easy loading. The short over all length and wheel base makes possible complete turns on 20 foot roadways. The Koehring Wheeler can load and haul more material than larger size units, it is claimed.

The Koehring Tractor speed can easily be synchronized with the crawler tractor for maximum loading effort. The push tractor loads another Wheeler when others are traveling to the dump, thereby requiring only one push tractor for a fleet of Koehring Wheelers.

New Goodrich Tire Line

Six new lines of "Super-Traction" tires for off-the-highway service, especially in mud and snow are announced by The B. F. Goodrich Company, Akron, Ohio. Leading these new products are the new "Truck-Bus Super Traction" tires in a complete range of sizes, both balloon and high pressure. These tires have broader, flatter treads with deep,

(Continued on page 176)

Shots from the FIRING LINE

Repair Fort Peck Dredge Pipelines During Winter Months

Repairing the dredge pipelines at Fort Peck Dam is a major job during the present winter shutdown of the dredges. It is estimated that pipe totaling over 65,000 feet in length will be repaired during the present season. This includes approximately 12,000 feet of fill line 28 inches in diameter with walls one-half an inch thick and about 35,000 feet of land line and 7,500 feet of floating line 28 inches in diameter with walls three-quarters of an inch thick.

Most of the pipe has been in use for at least four dredging seasons. During this time the sand, rock and gravel passing through the pipe has severely worn the steel at the bottom of the inside of the pipe. At the end of each season, therefore, the pipe has been turned part way to place an unworn section of the pipe in the bottom position. But after one short season and four long seasons of dredging, finding unworn sections of pipe is becoming more difficult and patching and "half-soling" of the pipe has become necessary.

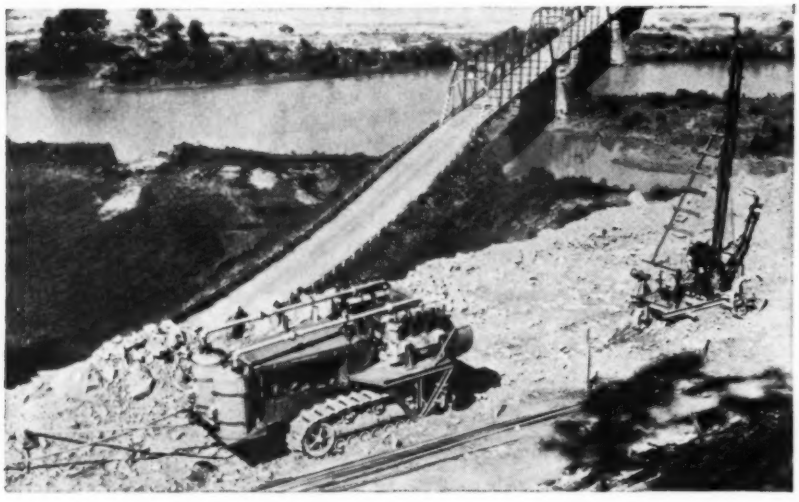
"Half-soles" are curved sheets of steel three-eighths of an inch thick and 24 inches wide which fit snglly on the outside surface of the pipe and are welded in place by electric arc-welding methods. This work is done by hand at the government's welding shop or in the field. All fill pipelines, land lines and floating liens are being examined and repaired or replaced where necessary.

In general two methods of determining the thickness of the worn pipe are used. In the first method the wall of the pipe is struck with a ball-peen hammer, and the depth of any indentation is measured. The depth of the indentation determines the thickness of the pipe according to a curve which has been prepared from the results of measuring depths of indentations and drilling pipe to measure actual thickness. The accuracy of the test depends to a large extent upon the ability of the test man to strike each hammer blow with the same force, and the men soon become experts in this work.

The second method of testing makes use of a large pair of calipers by which the thickness of the pipe wall near the ends of the pipe may be measured directly. Work on all phases of the pipe repair is progressing rapidly in preparation for the coming dredging season.

The amount of winter work being carried on at the Project has allowed the maintenance of a high level of employment which on January 15 was about 10 men more than for the same time last year. Project employment on January 15, 1938, was about 3,070 and on January 15, 1939, was about 3,080.

● International TD-18 TracTrac-Tor and Bucyrus-Erie M-81 Scraper owned by the Mohawk Construction Company excavating for a highway near Penn Yan, New York.



● High above the highway, this tractor mounted model 210 Davey Compressor owned by George M. Brewster and Son of Bogota, New Jersey, is working on the Mohawk Dam job. This dam is part of the Muskingum Valley Project located near Coshocton, Ohio.

Increase Reclamation Budget

Construction projects of the Bureau of Reclamation fared well at the hands of the Budget Bureau, and reclamation officials consider the appropriations in the budget report ample to carry on the construction program for the next fiscal year. With seven fewer projects listed than in the previous budget, the appropriations recommended by the Budget Bureau are about $10,000,000 more than was appropriated for the 1939 fiscal year.

Altogether, $49,648,000 is asked in the new budget for continuing reclamation construction projects for the 1940 fiscal year. All projects which had appropriations for 1939 except two that have not yet started, have received funds. The two exceptions are the projects at Deschutes, Oregon, and at Twin Springs, Idaho.

Five other projects were dropped from the list of appropriations requested, because these are completed or have funds available. The projects dropped are: Ogden River, Utah; Upper Snake, Idaho; Sun River, Montana; Klamath, Oregon and California; Marshall Ford Dam, Texas.

Last year, the Bureau of Reclamation projects received a total appropriation of $39,615,000, and, in addition, there was a PWA allotment of $28,-

750,000, which remains available for the next two fiscal years.

No new projects are listed in the Reclamation Bureau estimates for the 1940 budget. Those listed, with amounts recommended, are:

Reclamation Fund

Gila projects, Arizona	$ 700,000
Colorado-Big Thompson project, Colo.	1,500,000
Pine River project, Colorado	1,000,000
Boise project, Payette division, Idaho	500,000
Minidoka project, Idaho	100,000
Carlsbad project, New Mexico	100,000
Tucumcari project, New Mexico	250,000
Rio Grande project, New Mexico	483,000
Owyhee project, Oregon	270,000
Rove River project, Utah	1,500,000
Yakima-Roga Roza project, Washington	1,000,000
Riverton project, Wyoming	100,000
Kendrick project, Wyoming	1,000,000
Shoshone project, Wyoming	450,000
General Investigations	200,000
Administrative expenses	750,000
TOTAL	$ 9,948,000

General Fund

Boulder Canyon, Arizona-Nevada	$ 4,000,000
All American Canal, California	2,000,000
Central Valley project, California	10,000,000
Columbia Basin, Grand Coulee Dam project, Washington	23,000,000
Administrative expenses	700,000
TOTAL	$39,700,000
GRAND TOTAL	$49,648,000

Halt Flood Control Work In Pennsylvania

Work was stopped February 1, on the state flood control program in Pennsylvania except on projects on which commitments had already been made; a balance of $3,000,000 in the state flood control fund was returned to the general funds of the state. Secretary of Forests and Waters G. A. Stewart said that the work was stopped because of the state's financial condition.

OBITUARY

George Lewis, former general manager of the Moffat Tunnel Commission of Colorado, died February 5, at the age of 63.

A practical mining, tunnel and construction man, Mr. Lewis was noted for his invention of the Lewis Traveling Girder, developed at the Moffat Tunnel and credited with the successful driving of that bore through difficult ground.

Born in New York, Mr. Lewis went to Colorado early in life. For twelve years he was construction superintendent for the Portland Mine at Victor and later supervised construction of the state office building. Made general manager of the Moffat Tunnel Commission at the start of the project he became chief engineer after R. H. Keays resigned in 1925. Since 1935 Mr. Lewis has been a member of the Colorado Industrial Commission.

Word has been received that George W. Dunphy died recently at Toledo, Ohio. An old time steam shovel operator, Bill, as he was known to the field, made many friends during the time he spent as an erection engineer with the old Vulcan Steam Shovel Company and the Bucyrus-Erie Company.

Surviving Mr. Dunphy are his wife Sarah, a brother Fred and four children.

Award Three Heart Mountain Canal Contracts

Three contracts amounting to $328,502 for construction of siphons for the Heart Mountain Canal, Shoshone project, Wyoming, were awarded recently by Secretary of the Interior Ickes.

The Utah Construction Company of San Francisco, California, on its bid of $84,537.50, was awarded the contract for excavating and placing the concrete for the Shoshone River siphon.

A contract for earthwork and concrete for the Buck Springs Creek siphon was awarded to the Barnard-Curtiss Company of Minneapolis, Minnesota, on the Company's bid of $31,864.50.

Welded plate-steel pipe for both siphons will be furnished and erected by the Consolidated Steel Corporation, Ltd., of Los Angeles, California, for $212,100.

These three bids were lowest for the respective items of ten proposals received and opened by the Bureau of Reclamation at its Cody, Wyoming office.

The Shoshone River siphon will be 10 feet 3 inches in diameter and 1,500 feet long, and is located 3 miles west of Cody, Wyoming. The Shoshone Canyon conduit, 12 feet in diameter, tunnels for a distance of 3 miles down the south side of the canyon of the Shoshone River from the Shoshone Dam. At the outlet portal the water will be divided, that for the proposed Oregon Basin Division continuing along the south side of the river and that for the Heart Mountain Division being carried across the river in this huge pipe.

The Buck Springs siphon, 8 feet 8 inches in diameter and 3,400 feet in length, will be located 9 miles north of Cody, Wyoming, on a 5½-mile reach of the canal which is now under construction.

Contracts have been awarded for all but the last four miles of the 28-mile canal, which will provide water for the irrigation of 41,000 additional acres of desert land, near the area already developed in the Shoshone project.

The Pan American Highway Conference

BY E. W. JAMES

The Third Pan American Highway Congress recently concluded in Santiago, Chile, marked a distinct phase in international progress in highway matters. Interest in technical subjects, consideration of general and specific finance and taxation, efforts toward correlation of routes, agreement on common standards, consolidation of effort, desire for speedy action, and above all, the greatly increased interest and original work of the South American engineers characterized the proceedings at all times both in the sectional meetings and the plenary sessions.

In the spring of 1938 the Chilean Government invited the member Governments of the Pan American Union to send delegates to a Third Pan American

(Continued on page 158)

Here's One **Sure** *Way to Reduce Handling Costs!*

Give the Long, Heavy Hauls to

GOODALL

"SSS" BRAND RUBBER CONVEYOR BELTING

You'll find a decided reduction in shutdowns due to replacements or repairs, on permanent or temporary installations, once you've put Goodall "SSS" Conveyor Belting on the job!

The cover stock of this belt is exceptionally strong and tough. The specially woven duck body combines longitudinal strength with proper flexibility. The friction between body and cover eliminates any possibility of ply separation.

For conveying rock, crushed stone, ore, cement and other heavy or excessively abrasive materials, "SSS" Belting will prove to cost less, on the basis of tonnage handled, than any you have ever used.

Let us quote on your requirements. Contact our nearest branch.

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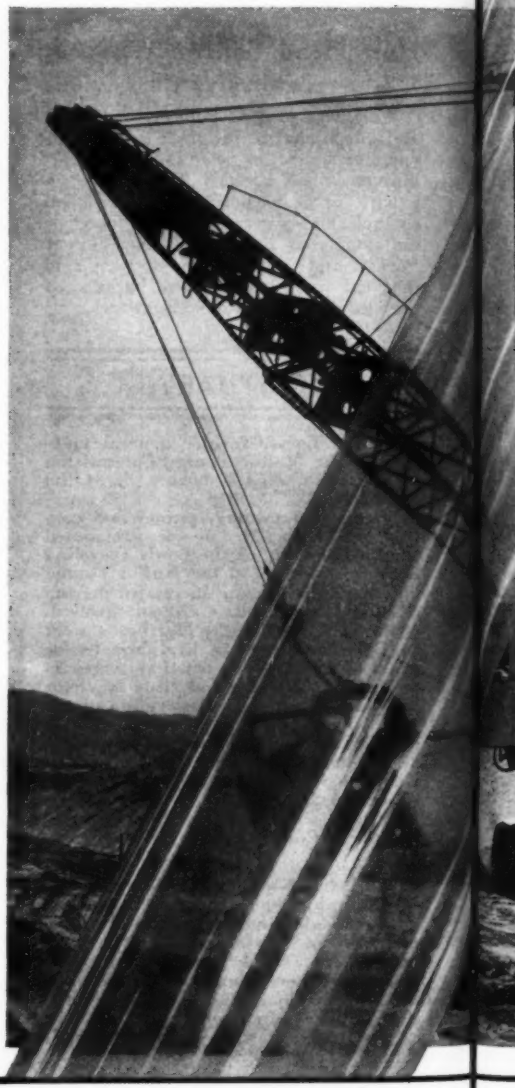
Salt Lake City Phoenix

For your convenience in writing to the Goodall Rubber Co., you will find a card bound in this issue.

THE COST OF THE RIGHT OIL FILM IS

A Drop in the



Machinery operating under rough service conditions needs oil with the great film strength and adhesiveness of Gargoyle Viscolite Oils.

These oils resist wear. Prevent avoidable repairs. Help pile drivers, power shovels, dredges, steam hammers, transmission gears on contractors' equipment keep on the job earning profits!

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The right lubricant for every machine...and new lubricants ahead of new needs...developed by world-famous research laboratories through close cooperation with machine builders.

73 years' experience—thousands of case histories—to guide in prescribing the right use of these lubricants to gain Lubrication Profits for you.

World-wide distribution and guaranteed uniformity—the same quality available everywhere.

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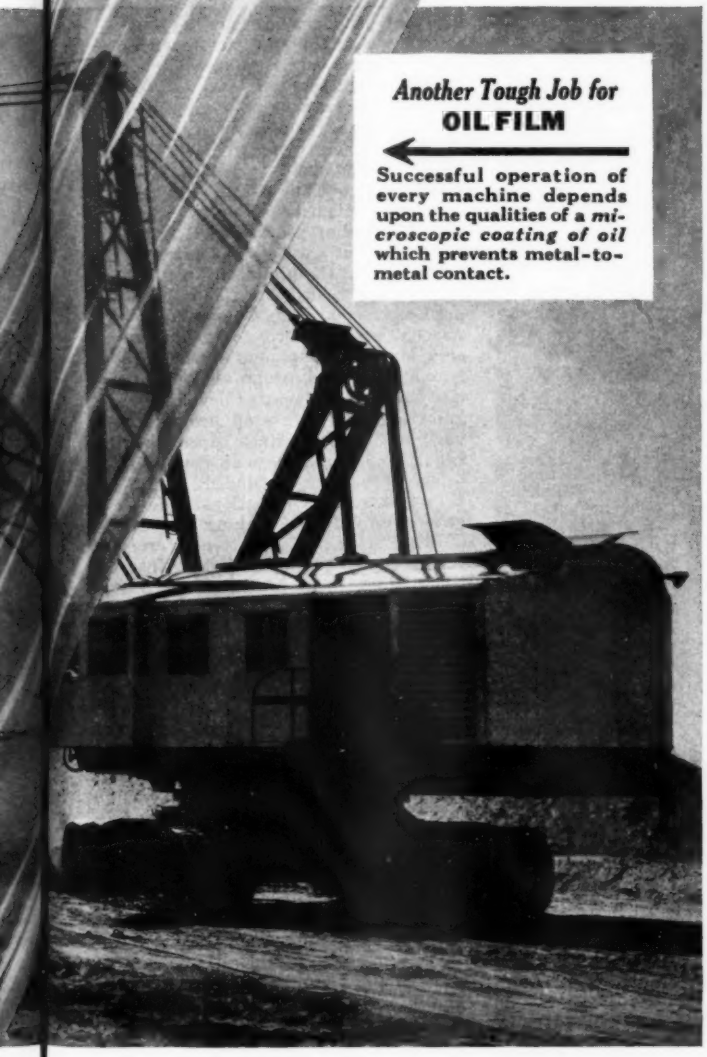
e Bucket—

OMPARED TO LOST TIME FOR REPAIRS!



Another Tough Job for
OIL FILM

Successful operation of every machine depends upon the qualities of a *microscopic coating of oil* which prevents metal-to-metal contact.

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Industrial Service and Lubricants Help to Lower Costs by

Correct Lubrication

GARGOYLE Lubricants

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(*Continued from page 155*)

Highway Congress to be held in Santiago, Chile, in January 1939. This Congress was held from January 11 to 19 coincidental with the First South American Engineering Congress, a convention of the Association of South American Engineers, an International Highway Exposition, and a Convention on Intellectual Cooperation.

16 Countries Send 65 Official Delegates

The Highway Congress was attended by 65 official delegates from 16 countries. The total of the visiting groups reached 240. The United States named as official delegates The Honorable Norman Armour, Ambassador to Chile, Chairman of the Delegation, and Messrs. Edwin W. James of the United States Bureau of Public Roads; Robert H. Baldock, Chief Engineer, Oregon State Highway Department; John Van Ness Philip, Member of the Finance Committee under the Buenos Aires Convention of 1936 on the Pan American Highway; B. M. Duncan, General Manager and Chief Engineer of the Overseas Highway Improvement District of Florida; and John Abbink, President and General Manager of the Business Publishers International Corporation. The advisors were Mr. Stephen James, Director of the Pan American Confederation for Highway Education; Mr. Barton P. Root, of the Bureau of Foreign and Domestic Commerce; Dr. W. R. Manning, of the Department of State; and Mr. George F. Bauer, of the Automobile Manufacturers' Association.

The American Delegation took an active part in presenting papers and in participating in all of the committee work of the Congress. The Bureau of Public Roads sent an exhibit displaying in maps and colored views the progress in road construction with special reference to the Pan American Highway. The Bureau and the Confederation for Highway Education joined in furnishing a series of film strips with Spanish script describing several methods of construction, soil stabilization and highway planning.

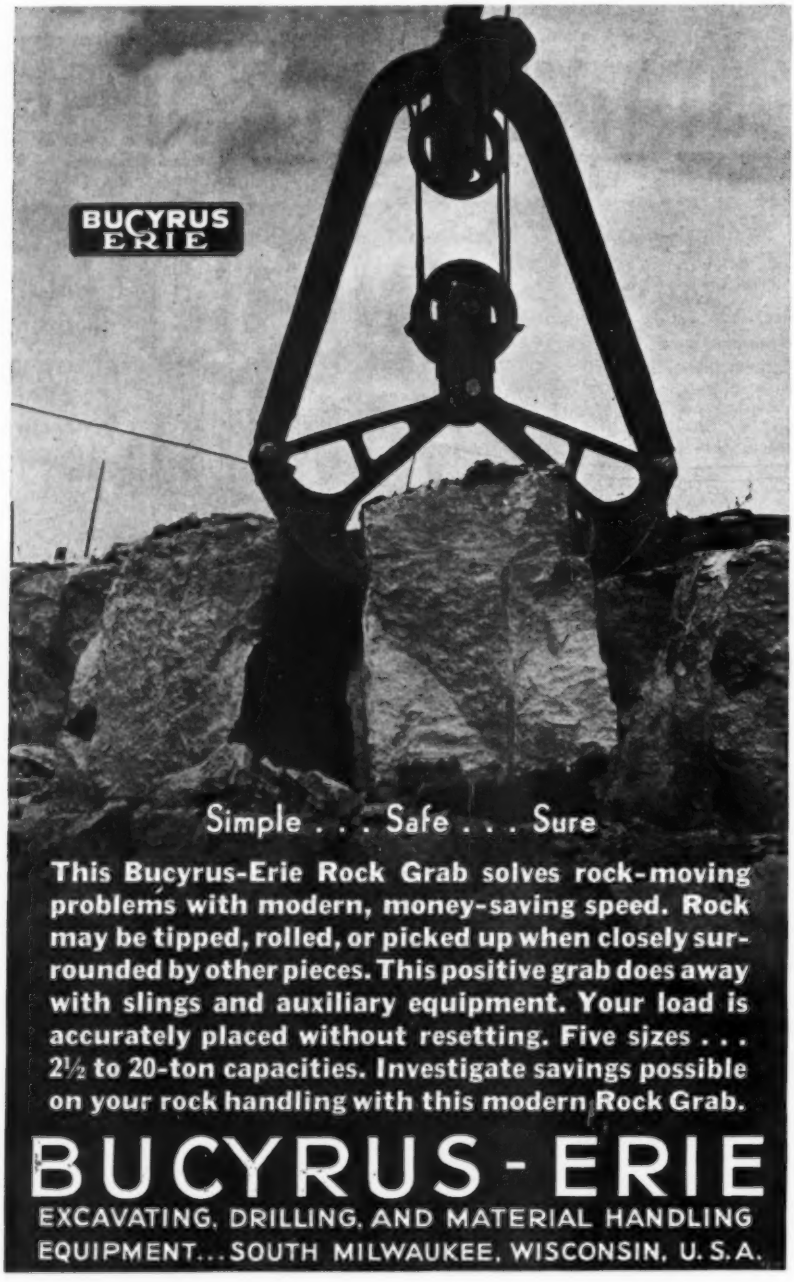
Two Significant Problems Face Delegates

The day for highway propaganda in South America is past. Every delegation gave evidence that the highway movement was well established in the countries they represented. The present insistent problems are how to continue construction along the most economical lines as developed by the latest scientific advances, and how to finance the desired highway programs.

The engineers of Latin America are attacking their own problems with a broad background furnished by the previous two Congresses and the exchange of scientific information during the intervening years. They have perfected their own organizations, as witnessed by the simultaneous sessions of the First South American Engineering Congress and the Convention of the Association of South American Engineers. Many of the papers presented original studies and proposals which carried their subject matter beyond present knowledge or suggested promising investigations along lines especially pertinent to Latin American conditions.

The Congress produced significant action in several directions. The Delegate from Mexico, taking the report of the Financial Committee referred to the Congress by the Eighth International Conference of American States, at Lima, which preceded it by the short interval of only three weeks, proposed a general plan for financing a Pan American system of highways through an intermediary, non-profit corporation or authority. Mexico has a member on the Financial Committee created under the Buenos Aires Convention of 1936. The countries which are stronger financially recognized the requirements of the less favored ones in accepting a proposal for furnishing financial support through some form of common action or cooperation. The details of any plan must of course remain for future development; but the nature of the proposal is significant.

With respect to the highway ambitions of the several countries significant action appeared in a long recommendation proposed and adopted, that speeds up action contemplated in the Pan American Highway Convention. Appar-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Simple . . . Safe . . . Sure
This Bucyrus-Erie Rock Grab solves rock-moving problems with modern, money-saving speed. Rock may be tipped, rolled, or picked up when closely surrounded by other pieces. This positive grab does away with slings and auxiliary equipment. Your load is accurately placed without resetting. Five sizes . . . 2½ to 20-ton capacities. Investigate savings possible on your rock handling with this modern Rock Grab.
BUCYRUS-ERIE
EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U.S.A.

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KOEHRING

Wheeler method
Moves Dirt • Faster • Cheaper

KOEHRING HEAVY-DUTY

Loads of power to load — exceptionally high speed for travelling — Push tractor applies power where needed, ***behind*** the cutting blade. High speed, time-tested job-proven Koehring Tractor hauls the Wheeler to and from the dump. Write for information about costs and production of ***This Newest Method— The Koehring Wheeler Method***

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

HEAVY-DUTY CONSTRUCTION EQUIPMENT

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ently impatient at the slow motion of diplomatic procedure, a resolution provides for a special conference of technical delegates representing Panama and the countries of South America, to be held at Panama, to report within six months on the routes selected for a Pan American system of trunk highways, the common points on frontiers, the general requirements of geometrical highway design and other pertinent details. This action is significant because the Buenos Aires Convention provides for a technical commission but it cannot function in a representative manner until several countries in South America ratify its terms and appoint their technical representatives. There was doubt that this course would produce results as soon as desirable. Provision was made in the same recommendation that a financial group representing the same countries meet in Buenos Aires on May 25 of this year to consider the financial problems involved.

Next General Session Will Be Held In Mexico City

All this action indicates the desire to proceed without delay with the general program of international highway construction and a disposition to cooperate as a group, just as Panama and the countries to the north have cooperated during the past few years.

On invitation of the Mexican Government the Congress voted to hold the next general session in Mexico City, and according to the usual practice and with the general consent of the delegates at the last plenary session, the Mexican Government, through the Pan American Union, will decide upon and announce the date and provide an agenda for the next session. It was widely suggested that a date be selected, if possible, that would not coincide with the year of the International Convention of Road Congresses.

Wiota - Fort Peck Railroad Completes Fifth Year

The Wiota-Fort Peck Railroad completed its fifth year of operation on December 31, 1938, with the movement of quarry stone reaching an all time high. A total of 15,370 cars of rock were received during the year, although there were four months during which no movement of this commodity was made. The heaviest movement of this class of freight occurred in October, 1938, when 3,116 car loads arrived on the job. The heaviest movement of all types of freight occurred in August, when a total of 4,640 loads was received. During the year, all other types of freight dropped in car load receipts. Gravel for blanketing the upstream face of the dam was received only six months during the year and the number of cars dropped to 6,442.

In spite of the fact that car load receipts showed a considerable decline, the railroad system, upon which the entire Fort Peck project is dependent for its freight shipments, remained one of the busiest sections during the working season.

Beginning in October, 1937, a relocation of the main line railroad was started. At a point a short distance south of Mile Post 12, this line was laid on what is known as the flood plain below the dam, and continued in a southernly direction until reaching the downstream face of the dam proper, and continuing east along the dam toe until it reached a point just south of the tunnel outlets. The total length is 13,472 feet. The line was completed on January 15, 1938. This relocated line eliminated the use of the long trestle, which was dismantled after the new line was put in service, and the steel trestle work and girders were salvaged. The line also eliminated a grade ranging from 1½ to 2 per cent and nearly two miles in length.

Expect to Break Concrete Production Record

(Photo on Front Cover)

The daily production of concrete for completion of Grand Coulee Dam is expected this year to break the world's record for output it established in 1937 when in a single day 15,844 yards of concrete were produced, enough to pave 6½ miles of 20-foot highway. That 24-hour record may be exceeded by enough to lay an additional mile of pavement.

Since Thanksgiving Day, 1935, when concrete placing began, five million cubic yards of concrete have been placed

STRENGTH · ELASTICITY · FLEXIBILITY · TOUGHNESS · DURABILITY

THE ACCIDENTAL FALLING . . . of an apple in an orchard started the chain of thought which led Sir Isaac Newton to propound his Law of Universal Gravity.

The Law of Leschen
QUALITY

No accident, however, led to the establishment of Quality as a requirement to be met by every Leschen product. Ever since Leschen Wire has been made there have been definite principles governing its manufacture . . . all based on the Leschen Law of "Quality First."

As a result, you can be sure "HERCULES" (Red-Strand) Wire Rope . . . true to its inheritance . . . will measure up to the highest standards of performance and meet the actual demands of the toughest jobs. Nothing is left to chance to give you long, safe and economical service.

You will get more out of "HERCULES" (Red-Strand) Wire Rope because the Leschen Law of Quality demands we put the utmost into it.

In order to be suitable for all purposes. "HERCULES" (Red-Strand) Wire Rope is made in a wide range of both Round Strand and Flattened Strand constructions—all of which are available in either the Standard or Preformed type.

"HERCULES" (Red-Strand) REG. U.S. PAT. OFF.
WIRE ROPE

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS - ESTABLISHED 1857
5909 KENNERLY AVENUE - - ST. LOUIS, MO.

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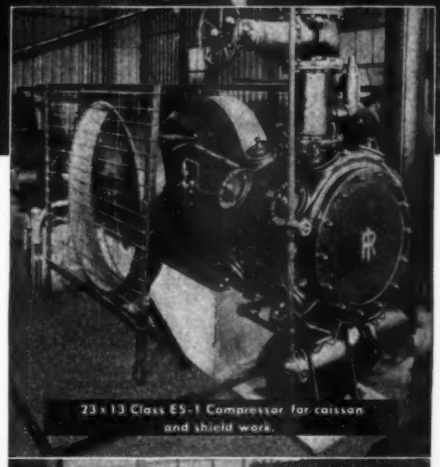
STARTING THE CHICAGO SUBWAY...



23 x 13 Class ES-1 Compressor for caisson and shield work.

Model 315 Ingersoll-Rand Portable Compressor.

Herlihy Mid-Continent Company have started work on Contract S-5 for the State Street subway in Chicago. This project demands dependable compressors for the air supply to the "sand-hogs", and for the operation of air tools.

The illustration shows the first compressor equipment being delivered to the job. A battery of Ingersoll-Rand stationary and portable compressors, similar to those shown, will supply low and high pressure air for this project. I-R air tools will do the digging.

Ingersoll-Rand equipment for the contractor includes stationary and portable compressors, rock drills, Jackbits, clay diggers, paving breakers, air hoists, sump pumps, etc.

730-1

Ingersoll-Rand

11 BROADWAY, NEW YORK, N. Y.

For your convenience in writing to the Ingersoll Rand Co., you will find a card bound in this issue.

in Grand Coulee Dam, the biggest block of artificial stone ever made, and already the biggest man-made structure of all time though less than half completed. Five and a half million yards of concrete have yet to be placed.

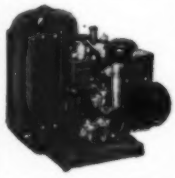
The enormous quantity of concrete to be made, and the high rate of production required on this project justified the installation of mixing equipment of great capacity, and the use of control devices of great intricacy and precision. The mixing plant is known locally as the house of magic.

Mixing cycles are controlled in terms of seconds, automatically, by ingenious electrical and compressed air devices; and by the simple shifting of a control lever the components of water, cement, sand and gravel for four-yard batches of concrete, are weighed out precisely in proper proportions for any one of five different mixes.

Rows of lights, under the remote control of the concrete dispatcher, tell the mixer operator how many batches and what kinds of concrete are wanted. Numerous pens, drawing lines on a wide moving strip of paper, record the filling of the weigh-bins, one for each component. When the proper quantities of materials for a complete 4-yard batch are weighed out, and no sooner—this takes 17 seconds—the batch is dumped into one of four continuously-rotating 4-yard mixers.

In the early days, three minutes of mixing were required to meet the rigid specifications; but through experimental work, by Bureau of Reclamation technologists, the blading in the mixers has been simplified, the mix improved, and the mixing time reduced to two minutes. Only a minute saved per batch, but a great saving made in the total time required for mixing—over two and a half million minutes on the job—half a year.

LIGHT *for* NIGHT WORK
AND
POWER *for* PORTABLE TOOLS
FROM YOUR OWN
ELECTRIC PLANT



On EXCAVATING and CONSTRUCTION JOBS where Main Line Current is not available, ONAN ELECTRIC PLANTS will supply the necessary "Juice" for operating FLOOD-LIGHTS, DRILLS, SAWS, GRINDERS, SANDERS, COMPRESSORS, WATER PUMPS, SHEARS, PIPE THREADERS, AND CEMENT TAMPERS and POLISHERS. Jobs can be completed FASTER, SAFER and at LOWER COSTS.

No Job is too large or too small for an ONAN PLANT. Available from 350 to 50,000 Watts. A LIGHTWEIGHT, 600 Watt DC Portable Model weighs but 71 lbs.; a 1500 Watt 110 Volt, DC Model but 145 lbs. Available in 110 or 220 Volt, AC; 12, 32 and 110 Volt DC; also Dual Voltage AC-DC Types. Manual, Full Automatic and Self-Starting. ONAN ELECTRIC PLANTS are HEAVY DUTY, SUBSTANTIAL and ECONOMICAL TO OPERATE. Built completely in our own Factory. Thousands in use in Homes, Farms, Camps and Public Buildings. Operate Lights, Radios, all Appliances. Shipped, READY TO RUN.

Complete Details and Prices on Request.

D. W. ONAN & SONS
673 Royalston Ave. Minneapolis, Minn.

Hazard Oldtimers

Talk that men past 40 have small chance in today's industry is largely based on the assumption that the elder workers have been abandoned or shunted to the pension rolls before their days of productive labor are over.

A substantial argument in the negative has recently been provided by the Hazard Wire Rope Division of the American Chain & Cable Company, Inc., Wilkes-Barre, Pennsylvania. This company comes forward with the revelation that its payroll carries the names of 14 employees, each with individual records of from 40 to 67 years of service, these men collectively representing a total of 695 years of continuous employment with one organization.

The Hydraulic Dredge as a Defense Against Bombing Raids

By V. R. STIRLING, Senior Engineer, U. S. Engineer Office, Duluth, Minnesota

The general tendency in foreign countries seems to be to hunt for cover when a bombing plane appears in the sky and the safest place is conceded to be a hole in the ground. Starting with these general principles, the suggestion is advanced that bomb-proof shelters for military objectives and for civilian population can be created at fairly reasonable expense by providing an earth blanket over them instead of by delving into the ground.

The following suggestions are not intended to apply to the towering skyscrapers of our great cities but to buildings of moderate height, such as factories, hospitals, water works, power houses, and multiple dwellings, as well as to railroad yards and airplane hangars.

The protection would be afforded by a structure built on the principle of a sand bin, with the bins supported by columns of sufficient height to provide a ceiling over the building to be protected. These bins should be water-tight and of sufficient depth to contain a blanket of earth sufficiently thick to destroy the force of a bomb. Usually the earth can be filled into the bins more economically by a hydraulic dredge than by any other means, although the water should be drained off in order to provide a sand cushion.

After the fill has been made it may be leveled off and used as a park, playground, landing field or for any other useful purpose. Access to this area may be provided in any way considered desirable at the time of design. The writer estimates that about three million yards of dredging would be required to protect one city block six hundred feet square.

Report Flood and Harbor Jobs

The annual report of the Chief of Engineers estimates that $350,000,000 could profitably be expended during the fiscal year ending July 1, 1940, for flood control works and for improvement of rivers and harbors.

This sum includes $248,280,000 for flood control, of which $51,000,000 is for work on the Mississippi River and its tributaries. For rivers and harbors, the Chief of Engineers approved $154,714,000, of which $51,738,000 would be for maintenance and $102,976,000 for new construction.

Budget estimates presented to Congress by President Roosevelt would al-

Owen Buckets first take form on the drawing board, but back of that activity is years of specialized experience in encountering and solving digging and material handling problems.

Today, as in years past, Owen continues to be a name which stands for the utmost in performance and durability.

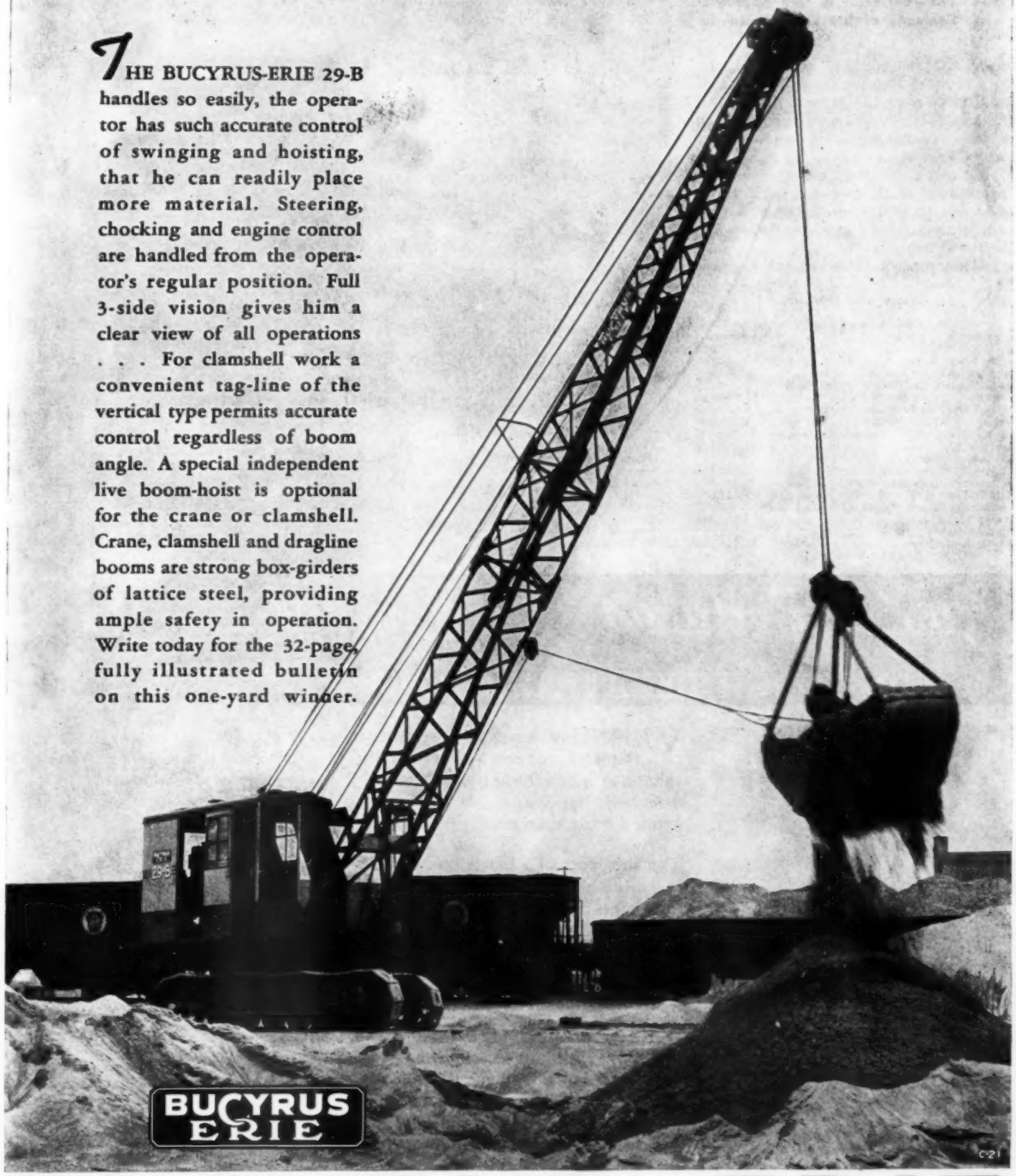
Get the Owen Catalog.

***The* OWEN BUCKET Co.**
6095 Breakwater Ave., Cleveland, O.
Branches: New York Philadelphia Chicago Berkeley, Cal.

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

ACCURATE CONTROL —for fast, profitable clamshell work

THE BUCYRUS-ERIE 29-B handles so easily, the operator has such accurate control of swinging and hoisting, that he can readily place more material. Steering, chocking and engine control are handled from the operator's regular position. Full 3-side vision gives him a clear view of all operations . . . For clamshell work a convenient tag-line of the vertical type permits accurate control regardless of boom angle. A special independent live boom-hoist is optional for the crane or clamshell. Crane, clamshell and dragline booms are strong box-girders of lattice steel, providing ample safety in operation. Write today for the 32-page, fully illustrated bulletin on this one-yard winner.

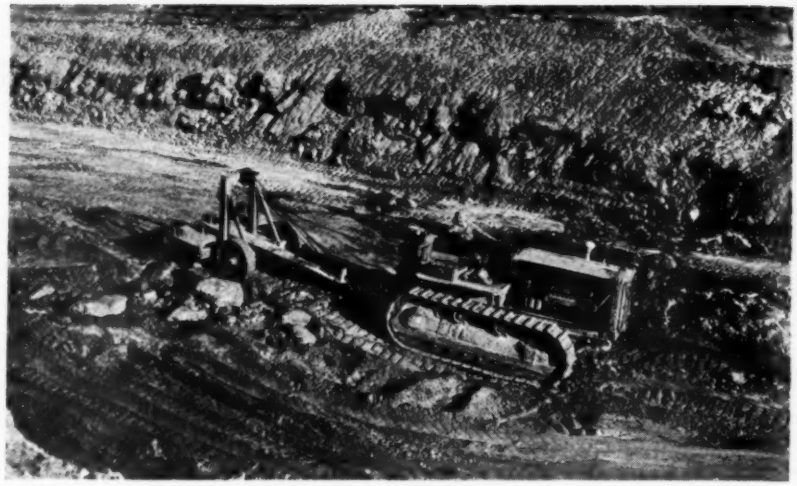


BUCYRUS-ERIE

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

● **A road job between Blue Mounds and Ridgeway, Wisconsin, requires the removal of 190,000 yards of rock and 157,000 yards of dirt. In addition to blasting this LeTourneau Rooter and Caterpillar Tractor are used to prepare the ground for the scraper. The contractor is Fred Kutzke & Company of Brooklyn, Wisconsin.**



locate $221,000,000 for expenditure by the Corps of Engineers, an increase of $28,819,000 over the present fiscal year. Of this, $110,000,000 was to be devoted to flood control work, exclusive of the lower Mississippi.

Placing a project on the list of "profitable" work does not necessarily mean that it will be undertaken, but, in general, available funds are devoted to the listed projects.

Larger projects listed are as follows:

Rivers and Harbors

(New Work Only)

Projects	Amount
Boston harbor	$1,326,000
New York harbor	2,050,000
Hudson River	1,100,000
Great Lakes to Hudson River waterway	5,000,000
New York and New Jersey channel	5,000,000
Delaware River, Philadelphia to sea	3,500,000
Pearl River, Mississippi and Louisiana	1,800,000
Southwest Pass and South Pass, Mississippi River	1,694,000
Calcasieu River and Pass, Louisiana	1,500,000
Sabine-Neches Waterway, Texas	1,314,000
Louisiana-Texas intracoastal waterway	2,034,000
Buffalo Bayou, Texas	1,500,000
Mississippi River	13,944,000
Missouri River, mouth to Sioux City	9,885,000
Missouri River at Fort Peck	8,350,000
Illinois Waterway	2,622,000
Ohio River open channel	1,250,000
Saginaw River, Michigan	1,030,000
San Diego harbor	1,500,000
Columbia River	2,793,000
Columbia River at Bonneville	7,704,000
Sacramento River debris dam	3,600,000
TOTAL	$102,976,000

Flood Control Projects

Merrimack River reservoirs	$9,000,000
Connecticut River reservoirs	4,410,000
Connecticut River	4,200,000
Southern New York Projects—	
Whitney Point reservoir	1,069,000
Hornel	400,000
Almond reservoir	1,182,000
Binghamton channel	2,500,000
Land, etc.	1,000,000
Additional reservoirs and channel improvements	2,859,000
Williamsport, Pa.	1,500,000
Codorus Creek, Pa.	1,625,000
Bayou Badcau, Louisiana	1,212,000
Memphis, Tenn.	2,628,000
Bois de Sioux River	1,474,000
Upper Mississippi, reservoirs and local projects	3,636,000
Mounds and Mound City, Ill.	2,000,000
Indianapolis Fall Creek levee	1,020,000
Evansville, Ind.	2,500,000
Paducah, Ky.	3,175,000
Tionesta Reservoir, Pa.	2,857,000
Crooked Creek reservoir, Pa.	2,185,000
Johnstown channel, Pa.	4,703,000
Mahoning Creek reservoir, Pa.	2,700,000
Red Bank reservoir, Pa.	3,000,000
Ironton, Ohio	1,710,000
Bluestone Reservoir, W. Va.	2,225,000
Ohio basin, reservoirs and local projects	18,071,000
Muskingum river reservoirs	2,000,000
Caddoa Reservoir, Colo.	3,500,000
Fort Supply reservoir, Okla.	2,392,000
Great Salt Plains, Okla.	1,867,000
Arkansas River basin	3,500,000
White River basin	3,293,000
Denison reservoir, Oklahoma and Texas	7,000,000
Missouri River basin	3,000,000
Kansas City	2,523,000
Los Angeles River drainage area	27,975,000
Santa Ana river basin	14,370,000
Columbia River basin	2,522,000
Willamette Basin	12,527,000
Mill Creek, Wash.	1,608,000
Mud Mountain dam, White River, Wash.	2,000,000
Mississippi River and Tributaries	50,000,000
Emergency work on the Mississippi tributaries	1,000,000
Sacramento River, Calif.	1,754,000
Total	$248,280,000

Costs Reduced
. . . ON TOUGH EXCAVATING JOBS

Sauerman Slackline Cableway digging hard-packed gravel from bar in the River Cazones, Mexico.

Sauerman Drag Scraper hauls blasted rock from quarry to crusher.

WHEN you have any work that requires moving materials distances of a few hundred feet, it is a safe bet that you can cut costs by using a Sauerman machine.

The first cost of a Sauerman machine is reasonable, operation is an easy one-man job, maintenance expense is small. Materials are excavated and hauled into place at an over-all cost of just a few cents per cubic yard handled.

Write for a copy of our 84-page Catalog and see for yourself how Sauerman machines have solved the material-handling problems of contractors, gravel producers, quarrymen, mine superintendents, and others, all over the world.

SAUERMAN BROS., INC.
474 S. CLINTON STREET, CHICAGO

Stemming Required with Permissible Explosives

To safeguard workers in coal mines the Bureau of Mines of the Department of the Interior tests explosives and blasting devices. The purposes of the tests are (1) to determine whether or not the explosive or device may be employed safely; and (2) to prescribe the conditions under which it should be used. Explosives and blasting devices that pass the tests are permissible ONLY when used in the manner designed by the Bureau. If the use does not conform to the conditions thus prescribed, the explosive or device is not permissible.

Representatives of the explosives and safety divisions of the Bureau have encountered considerable misunderstanding of these essential conditions of per-

For your convenience in writtng to Sauerman Bros., Inc., you will find a card bound in this issue.

● For moving rock on a rugged mountain road near Blackhawk, Colorado, the Platte Rogers Construction Company is using five Koehring Dumptors. The five units, each with a heaped capacity of 5¾ yards are moving approximately 2000 yards of rock on the ¼-mile haul each 8-hour day.

missibility, and particularly so with reference to the use of permissible explosives in excessive quantities per hole, or in blasting with permissible explosives not confined in a hole; also in connection with the use of Cardox, a carbon-dioxide actuated device set off by an explosive type heating element. One of the conditions essential to the safe and permissible use of permissible explosives and Cardox is that they shall be placed in a drill hole properly primed and followed with adequate incombustible stemming tamped firmly over the explosive or Cardox shell to the collar of the hole. This confines the force released by the blasting action, making the operation much more efficient, and at the same time tends to prevent "blowing out" of the shot or blasting device with attending danger of ignition or destructive ricocheting. Tests have shown that the stemming also tends to quench an ignitng action.

While no explosion of gas or dust is known to have been caused by permissible explosives or blasting devices when used in accordance with the regulations formulated by the Bureau of Mines, explosions have been caused when permissible explosives have been misused, as when fired in the open away from a confined drill hole.

There have recently come to the attention of the Bureau certain mining practices and even some published information which appear to encourage the use of Cardox without stemming. As such use is contrary to safety and to the conditions of permissibility established by the Bureau of Mines, this agency is broadcasting a warning that no blasting device is permissible if fired without stemming.

Likewise no permissible explosive should be fired in a coal mine without being adequately confined in a drill hole by the use of incombustible stemming.

Imposing figures, aren't they? These are the actual savings made by the Brooks Load-Lugger on many hand loading operations . . . cost cutting news for any man's pocketbook! You, too, should profit from the Lugger's continuous operation . . . save on its curtailing of investment in needless trucks. For the Brooks Load-Lugger and 4 to 8 buckets may replace several trucks . . . operate at a faster speed than any other equipment used on hand loading operations. Send for the economy story today! Demonstrations arranged in most sections.

BROOKS EQUIPMENT & MFG. CO.
86 Davenport Road, Knoxville, Tenn.

ROEBLING

WIRE · Wire Rope · Welding Wire · Flat Wire · Bare and Insulated Wires and Cables · Wire Netting and Cloth. John A. Roebling's Sons Co., Trenton, New Jersey.
Branches in Principal Cities

The pacemaker in wire rope development

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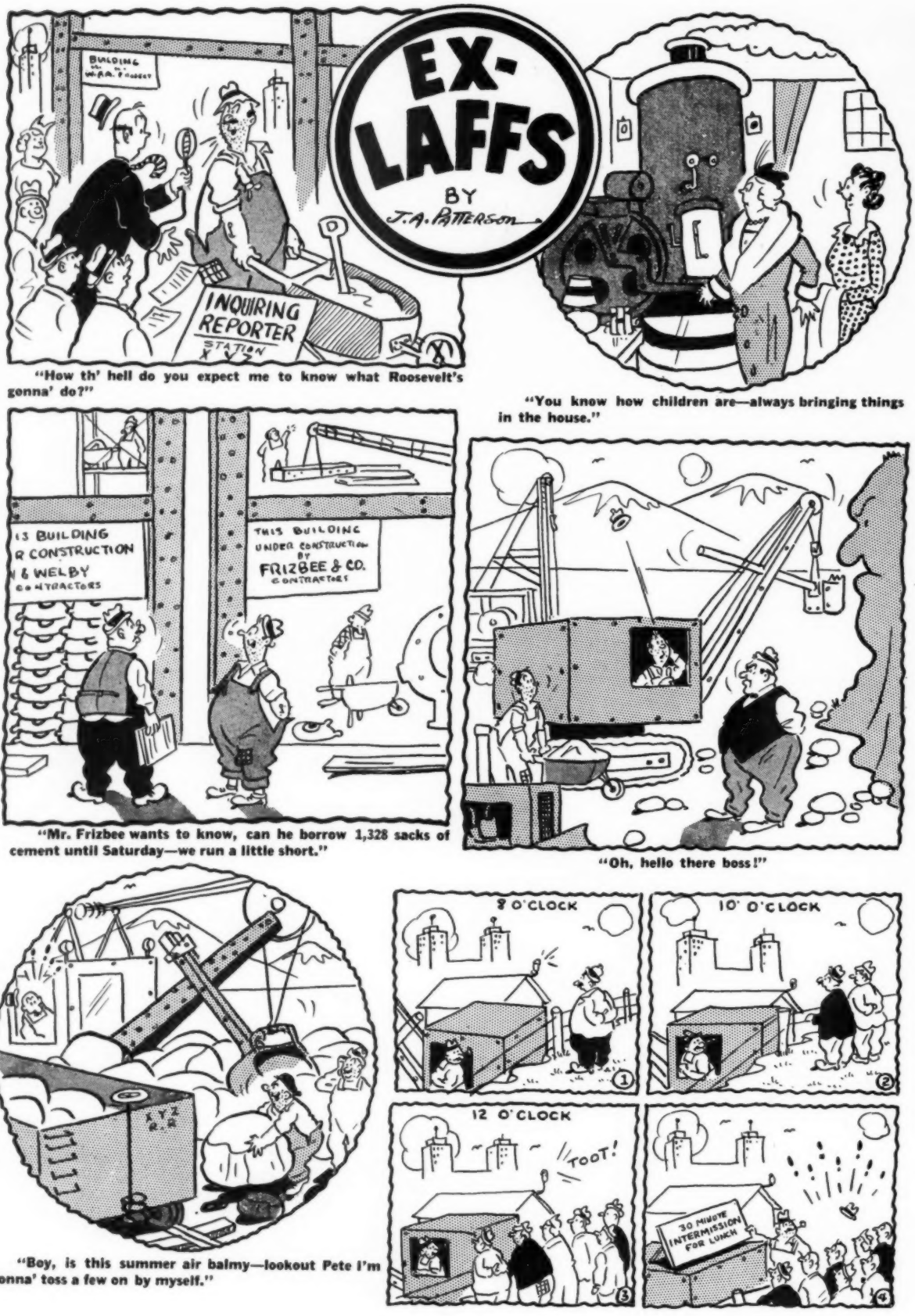
EX-
LAFFS
BY
J. A. PATTERSON
INQUIRING REPORTER
STATION XYZ
"How th' hell do you expect me to know what Roosevelt's gonna' do?"
"You know how children are—always bringing things in the house."
THIS BUILDING UNDER CONSTRUCTION BY FRIZBEE & CO. CONTRACTORS
"Mr. Frizbee wants to know, can he borrow 1,328 sacks of cement until Saturday—we run a little short."
"Oh, hello there boss!"
8 O'CLOCK
10 O'CLOCK
12 O'CLOCK
TOOT!
30 MINUTE INTERMISSION FOR LUNCH
"Boy, is this summer air balmy—lookout Pete I'm gonna' toss a few on by myself."

SHOWS ITS CLASS

ON THAT LAST HALF YARD

● It's the heaped load . . . that last half yard . . . which makes A-W Tractor Scrapers stand out as exceptional time-savers and money-makers.

These A-W Tractor Scrapers outperform because bit, pan and bowl have been engineered to insure that even flow of material which assures a full load each trip and the chance for profitable yardage every working day.

Austin-Western Tractor Scrapers are available in three sizes —5, 6 and 8 yards. One lever and one cable, control all loading and dumping . . . raising and lowering the bit with trigger-quick action. Wide spread rear wheels track inside the cut, always traveling over even ground, to steady the cutting edge and save power. The pan bottom always remains level while loading. Clearance between the ground and pan is ample for rough going.

These three sizes, with the high-output 12-yard hydraulic control scraper, give you a complete line to choose from, a perfect machine for the tractor you now own or plan to buy!

Write now for full details on the A-W Scraper best suited to your tractor equipment.

The AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Ill.

Motor Graders
Roll-A-Planes
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Washing Plants
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Motor Sweepers
Shovels and Cranes
Bituminous Distributors
Elevating Graders
5-Yard Tractor-Scraper
6-Yard Tractor-Scraper
8-Yard Tractor-Scraper
12-Yard Hydraulic Scraper

For your convenience in writing to Austin-Western Road Machinery Co., you will find a card bound in this issue.

• Each lantern can be firmly bedded as shown and will be hard to push over. The rubber strips can be used again and again.

A Solid Base for Warning Lanterns

Many times it is necessary to place warning lanterns or lights in sand or loose soil to warn people of an unexpected small excavation or pile of material. Suitable brackets or horses are of course a regular and routine provision where such work is carried on to any great extent but in many other instances the lanterns are almost carelessly tacked to odd sticks which often loosen, tip and fall causing the lantern to be extinguished if not to explode. Some very costly damage suits have been won easily due to such makeshift efforts.

An easy, practical way to overcome the difficulty of setting warning lanterns in such soft material is as follows: Cut off some three or four feet of old tire inner tubing in a straight strip four or five inches wide. Wrap this firmly around the base of the lantern and snap it into place with a rubber band which can also be cut from the same inner tube. A pocket over two inches deep extends below the bottom of the lantern into which the soil can be packed. Additional material can be pressed snuggly around the upper portion of the jacket as it is put into place.

The lantern is quickly and firmly set. It is not easy to tip or blow it over and the same strips can be used over and over again if desired. *Frank Bentley.*

Effects On Buildings of Ground Movement Resulting from Firing of Blasts in Quarries

Valuable information as to the effects produced upon buildings by ground movements resulting from the firing of blasts in the vicinity of quarries is being obtained by the Bureau of Mines, U. S. Department of the Interior, in the course of tests conducted at the new testing adit operated at Mt. Weather, Virginia. The Bureau of Mines, for several years, has been studying the characteristics of the seismic wave set up in the ground by quarry blasts and other sources of vibration. Recently, experiments have been made on a residential structure to observe the effect of the seismic wave on the building. The testing adit is almost directly under a building used as an office. Blasts were made in the adit and the movement of the building recorded by seismometers. The intensity of the blasts was increased until the plaster in the building was cracked.

It was found that a movement of nearly 0.10 inch was required to crack old brittle plaster and a movement of between 0.20 and 0.30 inch was necessary to crack

HAYWARD BUCKETS
USE RIGHT BUCKET FOR THE JOB
Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.
THE HAYWARD COMPANY
52-54 Church Street
New York, N. Y

Here Is a Bargain
in used excavating equipment
(taken from page 179)

BUCYRUS-ERIE 10-B Standard Trailer. Used very little. Excellent condition. Bargain price. Located Pittsburgh. Box 2252-SS.

For other bargains in shovels, draglines, cranes, locomotives, trenchers, and miscellaneous contractors' equipment turn to pages 179 to 182.

The largest listing of Used Equipment offered by any Publication Serving the Excavating Industry.

For your convenience in writing to The Hayward Co., you will find a card bound in this issue.

new but well seasoned plaster. In all cases, plaster failure was caused by differential or relative movement between parts of the structure rather than from strictly panel vibration of wall or floor.

Numerous tests made in houses in the field in which movement was caused by quarry blasts were tabulated and, when compared with the tests at Mt. Weather, it was found that the largest amplitudes recorded in the field were only 1/3 to 1/8 that found necessary to cause damage in the Mt. Weather tests. The average of 13 field tests was only 5 per cent of the damaging amplitude at Mt. Weather.

Details of these tests have been published in Report of Investigations 3431, "House Movement Caused by Ground Vibrations," which may be obtained from the Bureau of Mines, Washington, D. C.

CAN YOU HELP?

Charles M. Thompson, Dean of the College of Commerce and Business Administration at the University of Illinois, is gathering material that, in his words, "will reflect the economic history of our times." As a part of this material he would like to have a complete file of the back numbers of Excavating Engineer.

The Excavating Engineer Publishing Company has been able to supply a complete file of 1938 numbers, but numerous requests for copies in the past have so depleted the files that the older copies can no longer be supplied.

If you have back numbers which you would like to add to this worthy cause, please send them to:

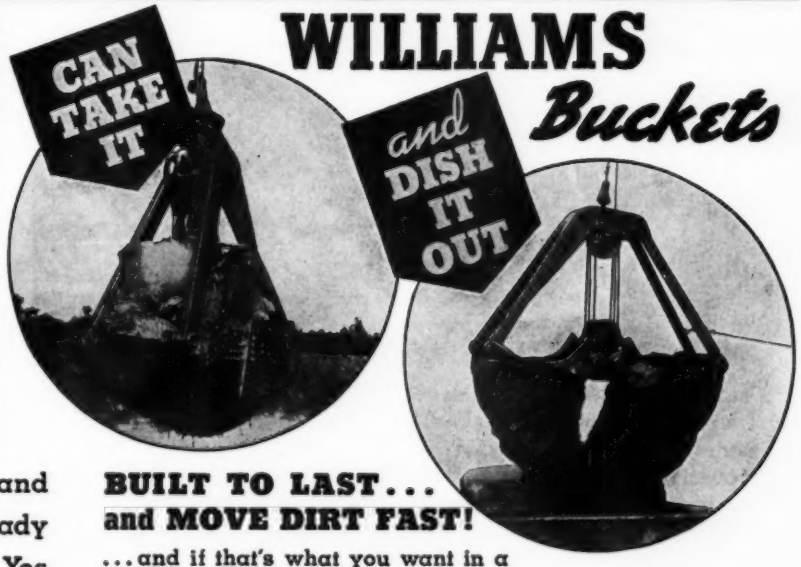
CHARLES M. THOMPSON, *Dean*
College of Commerce and Business Administration,
University of Illinois,
Urbana, Illinois.

New Safety Code for Compressed Air Machinery and Equipment

The American Standards Association recently announced completion and approval of the first safety code for Compressed Air Machinery and Equipment. This code is designed to cut down the number of accidents resulting from the wide use of compressed air today in garages, for rock drilling, for mining machinery, for cleaning, chipping, hoisting, and numerous other industrial applications. Nineteen national organizations and two departments of the Federal Government have participated in its development under the administrative leadership of the American Society of Mechanical Engineers and the American Society of Safety Engineers.

Although safety is often aided by the substitution of compressed air for hand labor, its use introduces other hazards that can be eliminated only by proper knowledge and care. Because of the accidents that have resulted from the misapplication of compressed air equipment, the installation of unsuitable, unsafe or faulty equipment, and the failure to maintain and operate equipment safely, a number of states and municipalities have adopted regulations for its use. The present code, which has been developed out of the combined experience of manufacturer, user, insurance, and governmental groups, is designed to serve as a guide to such authorities. It is also intended for voluntary use by concerns manufacturing or utilizing compressed

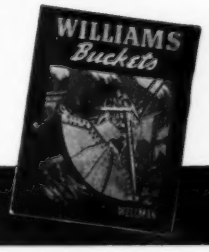
That's why Williams Buckets are profit producers. *Can they take it!* Man, they're built to tear into the heaviest, toughest, roughest digging. Williams Buckets stand up for years under most gruelling service. *And can they dish it out!* Just watch a Williams Bucket come up with a full capacity bite, and dump the load swiftly and cleanly...then swing back ready to wade into action again. Yes sir, Williams Buckets are truly



WILLIAMS *Buckets*

BUILT TO LAST... and MOVE DIRT FAST!

...and if that's what you want in a bucket, you'll find your particular type in the Williams Catalog. It's free!



THE WELLMAN ENGINEERING CO., 7002 Central Ave., CLEVELAND, OHIO

Send for Catalog. Distributors located in all parts of the Country represent the Williams Line of Power-Arm, Multiple Rope, Power-Wheel, Single Line, Hook-On and Dragline Buckets.

***built by* WELLMAN**

For your convenience in writing to The Wellman Engineering Co., you will find a card bound in this issue.

air machinery and equipment, and its recommendations may easily be followed by superintendent, foremen, designers, mechanics, and operators.

The code is being published by the American Society of Mechanical Engineers in a nine page booklet. It includes specific recommendations for the construction and use of compressors, tanks, pipe lines, etc., with separate sections on receivers and on utilization apparatus. It may be obtained from either the Society of Mechanical Engineers or the American Standards Association at a cost of 30 cents.

New Anti-Fogging Compositions with Glycerine

The efficiency of glycerine as a windshield wash, making for clearer vision and hence for safer driving, is a seasonal use for this versatile fluid with which many large transportation companies and individual truck and car owners are already familiar. In this connection, therefore, two new anti-fogging compounds utilizing the advantages of glycerine are of practical interest.

For those who prefer a liquid for use on windshields, windows and the like, there is a recent American patent (2,107,361) which consists of:

Glycerine	1 gal.
Camphor	4 oz.
Turpentine	½ pt.
Potassium oxalate	1 lb.
Oxalic acid	4 oz.

These ingredients are dissolved by heating together on a water bath. The mixture is applied by wiping the glass with a sponge dipped into the preparation.

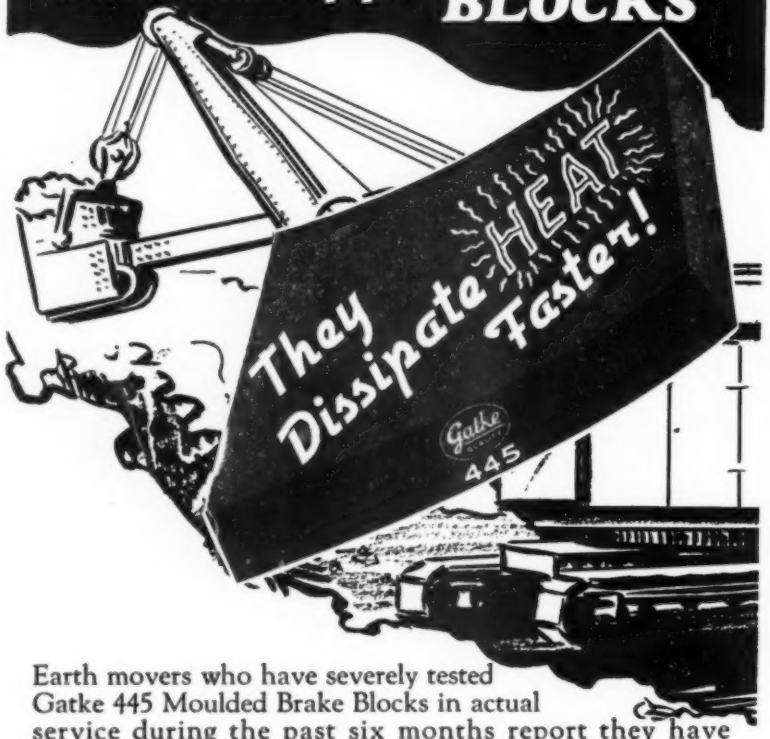
In paste form is another somewhat similar formula for a windshield mist preventative for which users report good results. This composition calls for:

4 oz.—Potassum Oxalate	112 gr.
2 oz.—Glycerine	60 ml.
1 gr.—Camphor	0.1 gr.
1 oz.—Turpentine	30 ml.

Heat on water bath.

The application of this product is reported to be beneficial both on the inside and on the outside of the windshield. The application to the outside of the windshield causes the rain to flow more evenly so that it does not reflect and refract street lights and the lights from other cars. On the inside, the application of the product prevents the accumulation of mist or fog and visibility is hence much clearer, thus making for easier and safer driving. The product is applied to a clean windshield and then rubbed well with a clean cloth.

Shovel Speeds Won't Affect
GATKE 445 BRAKE BLOCKS

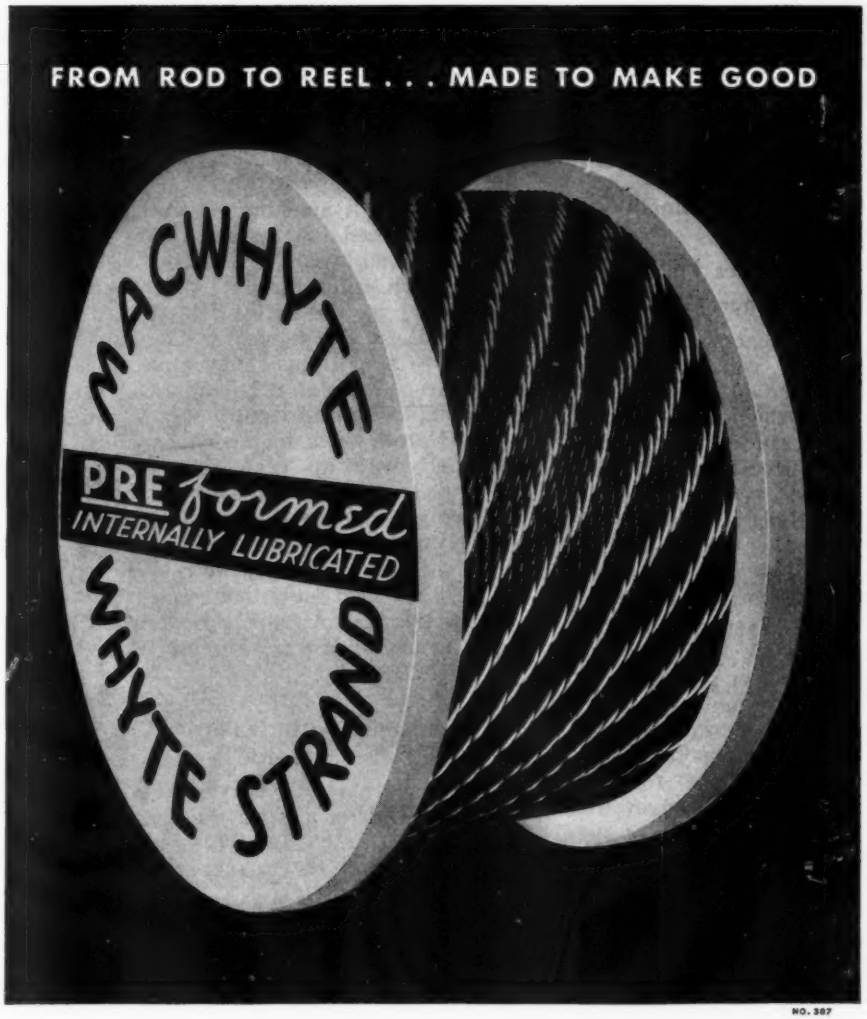


Earth movers who have severely tested Gatke 445 Moulded Brake Blocks in actual service during the past six months report they have never before experienced such uniform, smooth, positive action in picking up and releasing loads. Gatke 445 Moulded was developed with *greater capacity to dissipate heat.* The ideal material for your cranes, drag lines, and shovels. Take advantage of Gatke's *25 years experience* in pioneering better friction materials to meet specific conditions of industrial service. Gatke Brake Linings, woven or moulded, available in various widths and thicknesses for all applications.

GATKE CORPORATION
228 N. La Salle St. Gatke QUALITY **Chicago, Ill.**

● Time may be saved on many jobs by constructing a universal wrench to fit all parts where a wrench is being used, such as tanks and hose fittings on an acetylene unit. In this case a 1¼ opening was cut from a broken wrench, a 7/16 socket brazed to it, and then was brazed to one end of a wrench having ¾, ⅞ and 1 inch openings. To one jaw of the 1 inch opening was brazed a ⅜ socket.

For your convenience in writing to the Gatke Corporation, you will find a card bound in this issue.



NO. 387

LABORATORY TESTED

...which means that Macwhyte Wire Ropes, when given a "final OK" by the laboratory, are ready for dependable, economical service.

FIELD PROVED

...on all kinds of jobs, on all kinds of equipment, under all kinds of conditions. All year long, Macwhyte Engineers on the *job*, are constantly proving, improving, perfecting the *right* wire rope for *your* specific job.

MACWHYTE

Whyte Strand · PREformed

WIRE ROPE

MACWHYTE COMPANY · KENOSHA, WISCONSIN · Manufacturers of wire rope and braided wire rope slings . . New York . . Pittsburgh . . Chicago . . Ft. Worth . . Portland . . . Seattle . . San Francisco . . (Distributors throughout the U. S. A.)

For your convenience in writing to the Macwhyte Company, you will find a card bound in this issue.

Gila Canal Project

(Continued from page 141)

air was used in the driving head, which was suspended from the boom of a dragline.

Aggregates Processed Under Separate Contract

Aggregates, processed under another contract, were hauled from the adjacent plant to bunkers at the job in a Mack 7-yard dump truck and a 6-yard Autocar. Three Ford V-8 trucks, with welded two-batch bodies and Wood hoists, did the hauling from the bunkers to the 27-E Koehring paver, picking up cement at a central storage platform.

The paver was spotted on the right bank of the excavation for each 30-foot section and the concrete skip moved out on its horizontal boom to discharge into a loading hopper at the level of the runway to the forms. Rubber tired buggies conveyed the mix to spouts at the top of metal pipes through which it was placed. Acetylene torches were used to cut or lengthen these pipes as required. The concrete was consolidated inside the forms with Viber vibrators, supplemented by spading. Inlet and outlet structures were poured with a dragline handling the mix in a pour hopper from the paver to the forms. The finished concrete was covered with burlap for three days and kept wet for two weeks with sprinklers.

Reinforcing was cut at the yard with a Jardine power shear, and bent with Alamo and Kardong power benders. Steel was hauled from the yard to the construction on two White trucks, equipped with special flat racks 17 feet long. A Lorain 40 crane, equipped with a 20-foot extension on the regular 35-foot boom, located on the bank of the excavation moved the material to the siphon assembly.

To support the reinforcing properly while erecting, the bottom mat of the invert was laid ahead and pyramid shaped concrete footings, 12 inches square on the top, were poured over it, at intervals of three feet. Concrete for these footings was mixed in a small machine on the bank and passed down a metal chute to wheelbarrows. Template rings of 1 inch square rods inside, and wired to, the reinforcing rested on these footings. The templates were braced inside by two long bars, welded vertically in A shape, with horizontal bars welded from them to the ring, about half way up each side. When steel was all in place the template rings were cut at the bottom with a torch, collapsing sufficiently to be removed. They were re-welded for the next set with a Hanson arc welder and Airco acetylene outfit carried on a truck for use in the field.

Service Outfit Is Carried On Truck

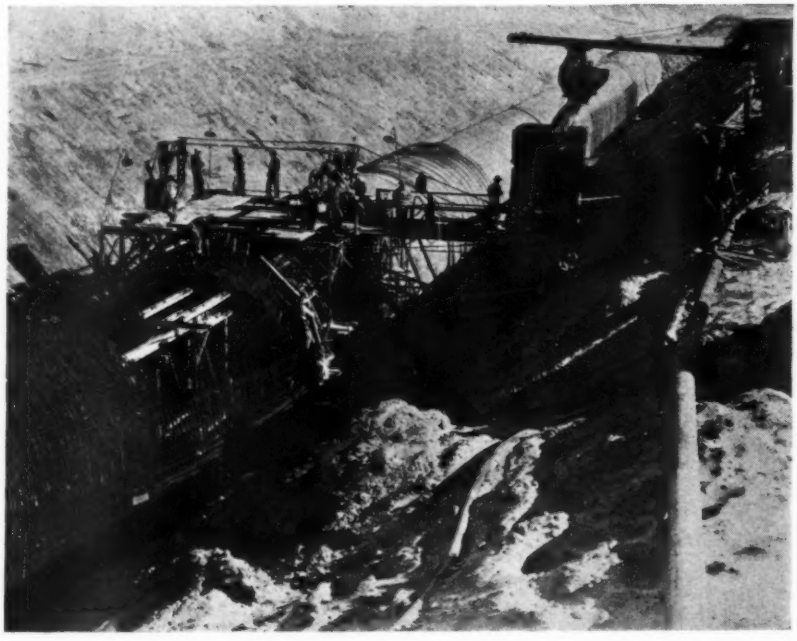
A traveling service station mounted on a Ford truck equipped with a steel flat rack body is used by the contractors to service equipment in the field. It carries 8 barrels of oil and greases, lubricating equipment, and a small Ingersoll-Rand compressor and storage tank with hoses for supplying air for tires.

The compressor and a ¾ H.P. generator used to charge batteries are mounted on a welded extension on the front of the chassis. A short shaft with universal joint and clutch arrangement connects with the truck drive shaft to run the compressor. It also drives the generator by means of a vee belt. A combination fly-wheel fan, on the short shaft, cools the unit when in operation.

The Metropolitan Construction Company, general contractors, employed about 130 men under the supervision of superintendent Joseph Muscola, while C. M. Hill, sub contractor for steel work, employed 15 men. J. B. Stringfellow's crew numbered 28.

W. A. Brenner is the engineer in direct charge of the work on the Gila Project and L. J. Foster is construction engineer in charge of the Yuma Office of the United States Bureau of Reclamation which awarded the contract.

(EDITOR'S NOTE—A story about the complete Gila River Project appeared on page 218 of the April, 1938, issue of Excavating Engineer.)



● Pouring concrete near the inlet. The Koehring paver, which moved along the right bank, is barely visible in the upper right hand corner.

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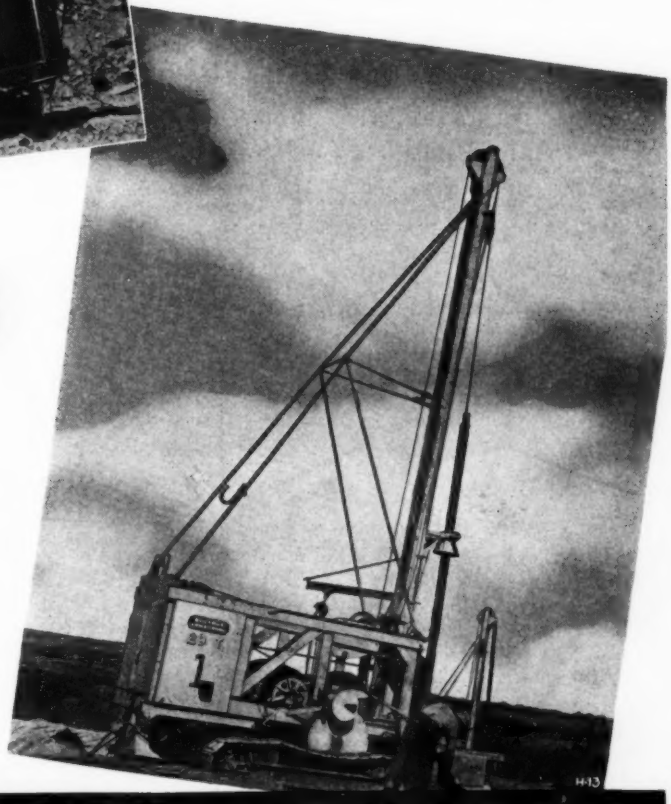

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NOT in the *Contract*

A man was walking along the railroad track with his head down when he was asked by a bystander:

"What are you looking for?"

"The president of this line." was the answer.

"But you won't find him here."

"Maybe not, but I am on his track."

Flying over the Bay of Naples, an air pilot turned to his contractor passenger and said: "Have you heard that saying, 'See Naples and Die'?"

"Yes," said the contractor.

"Well," said the pilot, "take a good look—the propeller's come off."

Pat was sick in a hospital ward with bronchitis. The doctor inquired: "Do you raise anything when you cough?" Pat was puzzled and shook his head in the negative. On the doctor's return Pat beckoned to him, and said: "Say, Doc, I've been thinking about that question you asked me, and I remember now that every time I cough I raise me left leg."

There is in Kansas a law still in existence, reading: "When two trains approach each other at a crossing, they shall both come to a full stop, and neither shall start up until the other has gone."

A collegian and a coed were on a teeter-totter board. The coed slipped off and her end flew up, resulting in an injury to the collegian's vertebrae.

Shovel operator: "I'd call that new maid of your wife's a honey, wouldn't you?"

Contractor: "Yeah, but not when my wife is around."

It is said that in certain parts of Scotland the superstition still lingers that it is unlucky to be the thirteenth to light a cigarette from one match.

Doctor: "Ask that accident victim what his name is so we can notify his family."

Nurse (a few minutes later): "He says his family knows his name."

"Did you ever consider an underarm deodorant, Mr. Murdock?"

An eminent judge at a banquet was offered champagne but refused it, saying he had tried it once but it didn't agree with him. Later, someone offered him a cigar.

"No, thanks," said the judge, "I smoked one once and didn't care for it."

An eminent lawyer nearby leaned over to his friend.

"You know," he whispered, "the judge has only one child."

Here is a notice for English-speaking motorists, posted outside the Central Police Station, Tokyo:

(1) At the rise of police hand, stop rapidly.

(2) Do not pass him by or otherwise disrespect him.

(3) When a passenger of the foot hove in sight, tootle the horn. Trumpet at him. Melodiously at first, but if he still obstacles your passage tootle him with vigour, and express by mouth the warning—Hi! Hi!

(4) Beware the wandering horse that he shall not take fright. Do not explode the exhaust box at him. Go soothingly by.

(5) Give big space to the festive dog.

(6) Go soothingly in the grease mud, as there lurks the skid demon.

(7) Avoid entanglement of dog with your wheel spokes.

(8) Press the brakes of the foot as you roll round the corner to save collapse and tie up.

Sadder than a mighthavebeener is a gogetter who's sorry he gotter.

Two inebriates met on the street.

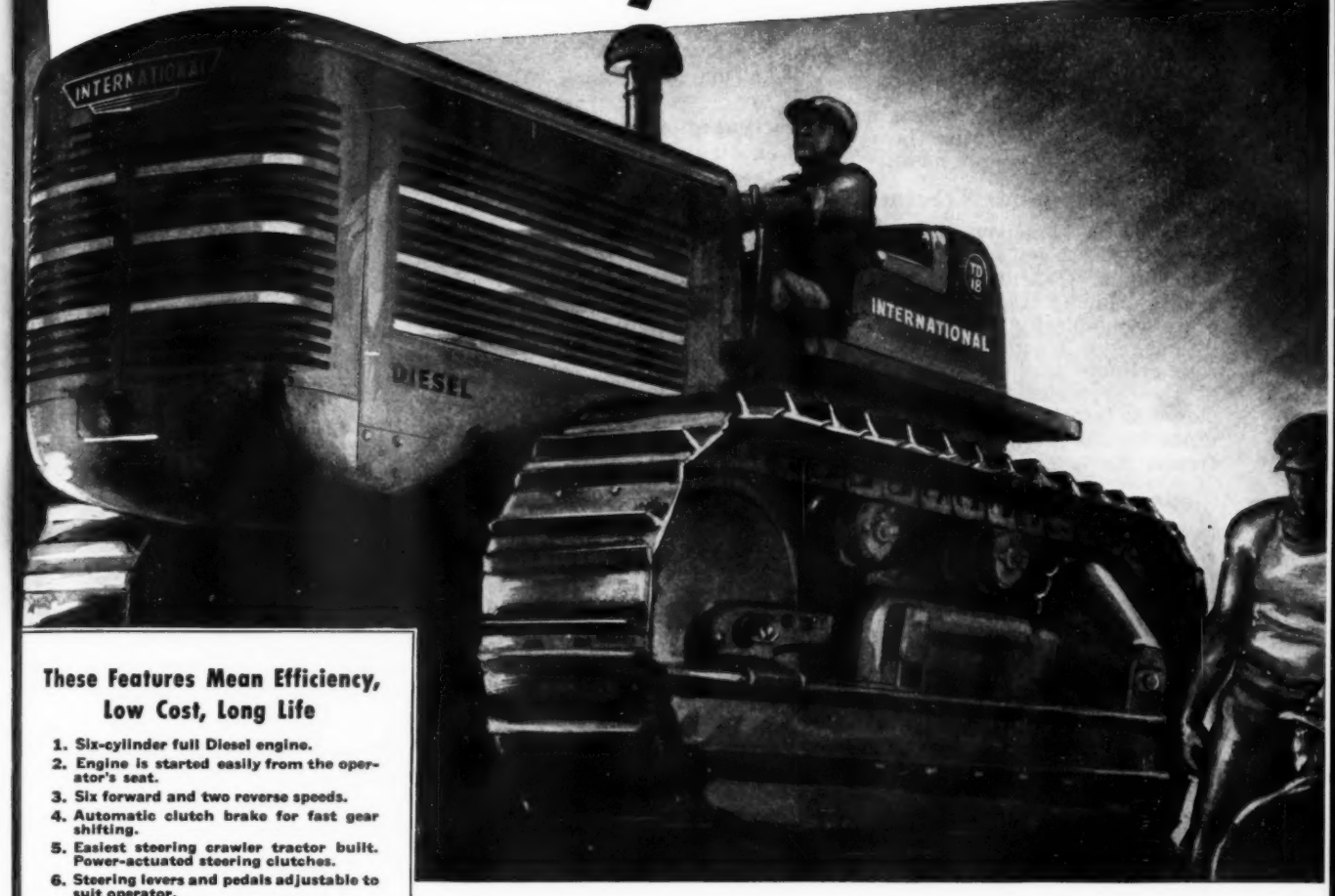
Said the first, "Do you know what time it is?"

Said the second, "Yes."

"Thanks," said the first as he staggered away.

Then there was the Egyptian girl who didn't know this from that. Now she's a mummy.

International Harvester ANNOUNCES A 70 H.P. DIESEL TRACTRACTOR



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1. Six-cylinder full Diesel engine.
2. Engine is started easily from the operator's seat.
3. Six forward and two reverse speeds.
4. Automatic clutch brake for fast gear shifting.
5. Easiest steering crawler tractor built. Power-actuated steering clutches.
6. Steering levers and pedals adjustable to suit operator.
7. Pivot shaft relieved of twisting stresses, and tracks kept in alignment, by ball-and-socket outer pivots, diagonal-arm inner pivot bearings, and roller stabilizer.
8. Track shoes keyed to track links to prevent loosening of shoes.
9. Triple-gear oil pump. Full-pressure engine lubrication at all working angles.
10. Positive track roller lubrication at all speeds. Quintuple-sealed track rollers have patented gravity lubrication at low speeds and pressure lubrication at high speeds. Oil and dirt seals on both sides of sprockets. Self-cleaning idler wheel.
11. Tocco-hardened crankshaft with replaceable main and connecting rod bearings.
12. Unit construction. Each steering brake, steering clutch, track frame assembly, and other units, adjusted or replaced without disturbing adjacent parts.
13. Famous TracTracTor accessibility. More productive hours, low maintenance cost.
14. Allied equipment engineered for the TD-18 by well-known manufacturers.

HERE is real news that operators of heavy-duty mobile power have long been looking for: International Harvester now presents a new 70 h.p. (*drawbar*) Diesel TracTracTor, extending the benefits of International design and service to a much broader field.

In this latest product you will find the sound engineering and precision manufacture that is well-known to all users of TracTracTors—*plus advanced design, many patented features and improvements.* The flexible adaptability of the TD-18, with its 6 forward and 2 reverse speeds, will be a surprise, whatever your experience up to this time.

Equipment especially designed for use with the TD-18 includes **SCRAPERS, BULLDOZERS, BULLGRADERS, ROAD GRADERS, WAGONS, SNOW PLOWS, WINCHES, LOGGING ARCHES.** Company-owned branches and International industrial power dealers will tell you all about the features of the International TD-18 TracTracTor.

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INTERNATIONAL POWER *is made by the makers of* **INTERNATIONAL TRUCKS**

Equipment You Ought to Know About

(Continued from page 153)

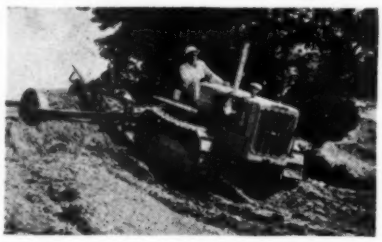
self cleaning design for surefooted traction in mud and gumbo.

Other new tires of this type are the "Heavy Duty" concrete batch trucks and other heavy equipment; the "Commercial" for use on ½ and ¾ ton delivery trucks; the "Tractor Grader" for graders and other road maintenance machinery; the "Heavy Duty" for 1½ ton trucks and the "Trailer Type" for free rolling wheels on scraper wagons and other heavy duty earth moving equipment.

New Caterpillar Tractor

A new 25-horsepower tractor, the R2, has been announced by Caterpillar Tractor Company, Peoria, Illinois. Designed to operate economically under all conditions, the tractor features a four cylinder engine with optional fuel systems—high compression for burning gasoline, moderate for using various grades of tractor fuels.

To increase the general working ability of the new tractor, and to cut as much as 20% to 40% off

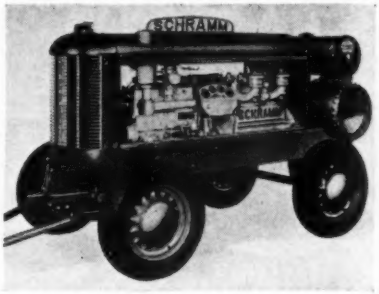


of normal working time, a five-speed transmission has been provided. This is designed to offer the correct working speed for every type of job that the machine will encounter.

At the same time it has been announced that an increase of about twenty horsepower has been added to the "Caterpillar" Diesel No. 49 Elevating Grader. This model is now powered with a six-cylinder, 66-horsepower diesel engine. The larger engine provides power for driving the carrier belt, resulting in greatly increased capacity for loading or casting dirt, it is claimed.

Exhibit "Utility" Compressor

Schramm, Inc., air compressor manufacturers of West Chester, Pennsylvania, will have on display at the San Francisco Road Builders' Exhibit, the new Model 105 "Utility" Compressor which is symbolic of the company's entire line of portable air compressors.



This compressor for the construction world presents many new features for the user. It corresponds closely to the design of modern automotive engines in that Schramm has adopted and perfected a cam-operated mechanical intake valve which also permits the use of engines operating at greater speed. Four and six cylinder construction has been adopted where formerly two and four heavier cylinders were common designs.

New Tractor Tread

A foldable cleat or grouser and tread shoe adaptable to the use of crawler type tractors has recently been designed by W. S. Taylor of 1911 East Roy Street, Seattle, Washington. This device, called Taylor Tractor Treads, was introduced to fill the want of an extended cleat necessary for maximum power under some conditions.

The tread plate, cleat and stop blocks with their large bearing area of steel contacts absorb all strains, it is claimed, in both positions, extended or not. The extended cleat riding the under side of the shoe side bars, with one inch by five-inch contact, eliminates all chance of damage. Another type of shoe carries a cleat extending eight inches into the ground.

"Are you in the habit of speaking to women you don't know?"

"Yeah, the ones I do know won't speak to me."

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BUCYRUS ERIE

Book reviews

A new booklet explaining the uses, adaptations and developments of all types of geared drives has just been announced by the Westinghouse Electric & Manufacturing Company. The booklet gives special emphasis on the quarry, textile, pulp and paper, coal, steel and petroleum industries, but also includes other industries utilizing electrical power. Single, double and triple reduction gearmotors; single and double reduction speed reducers; special vertical and right angle vertical geared drives; single and double reduction heavy duty mill units; horizontal speed reducers with shafts in vertical plane; geared drives for special problems and conditions; and open gearing are discussed. This new publication, profusely illustrated, may be secured from the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania.

Westinghouse combination linestarters, consisting of the "De-ion" linestarter and the Nofuze "De-ion" circuit breaker, is the subject of an 8-page illustrated booklet entitled "4 Points to Check in Motor Starters". Low installation and operating costs, compactness and safety are features of the combination linestarter. Copies of this booklet, B-2131, may be secured from the nearest district office or from headquarters at East Pittsburgh, Pennsylvania.

"All-Wheel-Drive" for Ford V-8 trucks from the light panel body type to the heavy cab-over-engine style is illustrated and described in a new bulletin released by the Marmon-Herrington Company, Inc., Indianapolis, Indiana. This bulletin explains the uses of all-wheel-drive trucks in the oil field service, in logging and construction work or where a truck must leave the highway and make its own road through desert, marshland or forest. Your copy can be had from the manufacturer.

A 16 page illustrated booklet explaining the uses, construction and performance of the new Bucyrus-Monighan 3-W Walking Dragline has been announced by the Bucyrus-Erie Company of South Milwaukee, Wisconsin. This booklet not only picks out and explains the important engineering and construction factors but also tells of the shipping conveniences of the machine after a job is completed. A copy can be had by writing to the manufacturer.

The Buda Company of Harvey, Illinois, announces the release of three new bulletins. The one titled "The Answer to a World-Wide Need" contains illustrations, diagrams, and literature on converting Ford gasoline trucks into Buda Diesel powered units. The other two illustrate the line of Buda Hydraulic Jacks and Buda Jacks for Builders and Contractors. Interested parties may receive copies by writing to the manufacturer.

Bulletin No. RC-2, illustrating and describing the latest models and broader line of Cedar Rapids Tractor-Crusher Units, is now offered by the Iowa Manufacturing Company, Cedar Rapids, Iowa. Write for your copy.

In a new illustrated bulletin directed to municipalities, industrial plants, and general power users, Worthington Pump and Machinery Corporation of Harrison, New Jersey, describes its latest type BB line of vertical direct-injection Diesel engines. Complete specifications of the BB engines, together with an interesting sectional view describing in detail the important features of design, are contained in the new bulletin. Readers may obtain their copy by writing direct to the manufacturer.

The Inland Lime and Stone Company, Manistique, Michigan, has recently published an attractive and well-illustrated folder describing the manufacture, distribution, and uses of limestone throughout the Great Lakes region. Readers interested in quarry operations will find this book to be of value to them.

The Austin-Western Road Machinery Company introduces a new theme in the copy and illustrations of its 1939 General Catalog now available to all interested parties. The book has been "humanized" and an effort has been made to make it more interesting.

The entire Austin-Western 1939 line is briefly described and fully covered in the 24 pages the bulletin contains. Among the products featured are the Model "99" Motor Grader, the two new scrapers of 6 and 8 yard capacities, the Patrol Sweeper and the Badger Shovel.

A new eight page catalog section on its line of heavy duty truck and bus and Diesel starting batteries has just been issued by The B. F. Goodrich Company, Akron, Ohio, and is available upon request. The section explains the construction of the battery line, wtih illustrations, and gives complete specifications and plate dimensions on each of the batteries offered for a specific service.

The Sullivan Machinery Company of Michigan City, Indiana, has released a new 20-page catalog describing and illustrating their Unitair stationary and semi-portable air compressors. Write for Bulletin A-22.

A compact data book, containing information on the selection, care and use of industrial rubber hose, has been published by New York Belting & Packing Company of Passaic, New Jersey. Copies of the data book may be obtained from distributors of the company.

The Bucyrus-Erie Company announces the publication of a Snow Plow bulletin which explains the convertibility of a Bucyrus-Erie Bullgrader or Bulldozer to a Heavy Duty Snow Plow. This piece of literature shows complete specifications for use with an International T-40 or TD-40 TracTracTor with either standard gauge or wide gauge treads. Copies can be obtained upon request to the company at South Milwaukee, Wisconsin.

ROGERS has built HEAVY DUTY TRAILERS exclusively FOR 25 YEARS

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For your convenience in writing to Rogers Brothers Corporation, you will find a card bound in this issue.

Trade notes

The Buffalo Mill Supply Company, Inc., 210 Main Street, Buffalo, New York, and the Northern Automotive Supply Company of Saginaw, Michigan, with a branch office at Bay City, Michigan, have elected to distribute the complete line of N. Y. B. & P. rubber goods according to an announcement sent out by the New York Belting and Packing Company.

A. W. Robertson, chairman of the board of the Westinghouse Electric & Manufacturing Company, recently announced the election of Roscoe Seybold to the board of directors of the company. Mr. Seybold, who has been associated with Westinghouse since his graduation as an electrical engineer from Purdue University in 1907, has been vice-president and comptroller of the company since 1934.

American Chain & Cable Company, Inc. announces that R. E. Greenwood has been appointed District Sales Manager of the Chicago territory of the American Chain Division, with headquarters at 400 West Madison Street, Chicago, Illinois—succeeding G. B. Kutz who has been transferred to York, Pennsylvania as Assistant to the General Manager of Sales, American Chain Division. It has also been announced that R. C. Brenizer has been appointed Philadelphia District Sales Manager of the American Chain Division, with headquarters at Second & Diamond Streets, Philadelphia, Pennsylvania—succeeding R. E. Greenwood, transferred to Chicago.

H. A. Everlien, Sales Manager, Mechanical Goods Division, United States Rubber Company, has announced that Frank M. Urban, formerly Assistant to W. T. Keenan, Manager Mechanical Sales, Chicago Branch, has been appointed Assistant Manager, Mechanical Sales, Chicago Branch. Mr. Everlien also announces that the Baltimore Branch of the Mechanical Goods Division will from now on operate as an independent Branch under R. F. Jackson as Manager of Mechanical Sales.

Simile for today: As amiable as a girl who married a boy for his father's money, to the new mother-in-law who married the old man for the same reason.

FOR SALE

RATES: 60c per line—minimum charge $2.40. Repeat insertions with no change in copy—three insertions for the price of two. ¶ Display advertising in this section at published display advertising rates. ¶ Estimate 41 characters per line, counting all spaces and punctuation as one character each. Allow ten characters for box number for blind advertisements. If address given, counts same as advertising copy. ¶ Rates are net (no commission, no discount) and payable in advance of publication. Send your remittance with insertion order and copy. ¶ Closing date—15th of preceding month. Example—January issue closes December 15.

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

TRUCK CRANES and SHOVELS

UNIVERSAL—24' boom crane—with distributor frame only. Waukesha 4-cyclinder 4¾"x6" engine. Good operating condition. Located Milwaukee, Wisconsin. Box 2207-SCC.

UNIVERSAL GAS TRUCK CRANE. Full revolving. 20' boom. ⅝-yard Kiesler clamshell bucket with teeth. 4-wheel Mack truck. 4-cylinder 4¾"x6½" engine. Good operating condition. Located Chicago. Box 2071-SCC.

UNIVERSAL — THEW Model AC-35, ½-yard gasoline truck crane. 28' boom. ½-yd. Owens digging bucket. Mack truck equipped with dual hard tires rear and pneumatic tires front. Condition good. Located Central New York State. Box 1193-SCC.

UNIVERSAL ½-yd. Shovel and 35' Boom Dragline. Waukesha Engine. Distributor frame for mounting on truck but not including truck. Thew caterpillar mounting available. Working condition. Located Illinois. Box 2233-SS.

SMALL SHOVELS
Under 2 Yards

⅜-YARD

BUCYRUS-ERIE 10-B Standard Trailer. Used very little. Excellent condition. Bargain price. Located Pittsburgh. Box 2252-SS

INSLEY—Type C ¾ Swing Gas Shovel. Located Indiana. Box 2238-SS.

½-YARD

OSGOOD—INVADER—Gas Shovel. 15' boom. 11'6" dipper handle, ½-yd. Esco dipper. Chain crowd. Buda 6-cylinder engine. Only handled 8,000 yds. A-1 shape. Located California. Box 2254-SS

BUCYRUS-ERIE 1020 Gas Rope Crowd shovel. ⅝-yd. dipper. Also drag shovel equipment. Waukesha engine. Good operating condition. Located Minnesota. Box 2253-SS

AUSTIN-WESTERN—½-yd. Shovel and Dragline. ½-yd. Page Drag bucket. Dragline equipment practically new. Very good condition. Located Wyoming. Box 2224-SS.

BUCYRUS-ERIE 16-B Gas Chain Crowd Shovel. Waukesha 6-Cylinder 3⅝"x4½" engine. Good working condition. Located Conn. Box 2225-SS.

BUCYRUS-ERIE 16-B Gas Shovel, Dragline and Clamshell. ⅝-yd. Shovel dipper. 35' Clamshell—Dragline boom. Winch head. Electric starter. Waukesha 6-cylinder 4"x4¾" engine. Very good condition. Located North Carolina. Box 2226-SS.

P&H MODEL 150. Gas. 16'6" boom. 12'6" dipper handle. ½-yd. dipper. Good operating condition. Located near Boston. Box 2255-SS

⅝-YARD

BUCYRUS-ERIE 19-B Gas. ⅝-yd. Positive Rope Crowd Shovel. Electric starter. Wisconsin Model L-4 6-cylinder engine. Located near Boston. Box 2227-SS.

BUCYRUS-ERIE TYPE AA ⅝-yard Air Tunnel shovel cat. mounted. Two speeds. Will work in 14' clearance. Reconditioned. Excellent condition. Located New York. Box 2180-SS.

BYERS MODEL 128. ⅝-yd. gas shovel and 35' boom dragline, including ½-yd. Page "C" drag bucket. 4-cylinder Diamond T engine. Engine overhauled 1937. Good operating condition. Located Illinois. Box 2087-SS.

GENERAL—⅝-yd. Gas shovel. Good condition. Located Eastern Pennsylvania. Box 2104-SS.

¾-YARD

BUCYRUS-ERIE TYPE B Steam Shovel. ¾-yard Quarry dipper. Cat mounted. New boiler installed late 1935. Good operating condition. Located Georgia. Box 2073-SS.

BUCYRUS-ERIE TYPE B. ¾-yard steam shovel and 40' boom clamshell. Cat. mounted. Located Buffalo, New York. Box 2005-SS.

P&H MODEL 400—Combination ¾-yard gasoline shovel and crane. Crane boom 35' plus 10' extension. Waukesha 4-cylinder 5"x6¼" engine. Located vicinity Boston. Box 2203-SS

⅞-YARD

BUCYRUS-ERIE — 1035 GASOLINE SHOVEL. Chain Crowd. ⅞-yard Dipper. 26-in. caterpillar treads. Electric starter. Located Boston. Box 1065-SS.

BUCYRUS-ERIE — B-2 — HIGH LIFT STEAM shovel. 21'3" boom, 16' dipper handle, ⅞-yard dipper. Single shaft caterpillar. Located Vermont. Box 1135-SS.

1-YARD

BYERS—MASSILLON—1-yd. Gas shovel. Good working condition. Located New York. Box 2256-SS

BUCYRUS-ERIE 32-B—Gasoline chain crowd 1-yard shovel. Electric starter. Single shaft cats. Wisconsin 6-cylinder 5"x6" engine. Few minor repairs needed. Otherwise excellent condition. Located near Boston. Box 2061-SS.

BUCYRUS-ERIE — D-2 1 yard Diesel Shovel. Atlas engine. Field reconditioned. Located North Carolina. Box 1079-SS.

BUCYRUS-ERIE 1030 — ELECTRIC TUNNEL shovel. Boom 10 ft. 7 in. Dipper handle 10 ft. 5 in. 1-yd. dipper. Boom hoist 5 ft. 6 in. rear end clearance. 2 motor—power supply 3 phase, 60 cycle, 440 volt. Located Virginia. Box 1068-SS.

BUCYRUS-ERIE—31-B STEAM SHOVEL. 22' boom, 15' dipper handle, 1-yard dipper. Now operating, can be demonstrated. Located Alabama. Box 1130-SS.

MARION MODEL 7, 1-yard steam shovel. Has not operated in the past five years. New flues recently installed in boiler. Located Buffalo, New York. Box 2006-SS.

NORTHWEST—Model 105. 40' boom clamshell and dragline including 1-yard Williams clamshell bucket. Also 1-yard shovel equipment. Field reconditioned summer 1938. Good operating condition. Located Wisconsin. Box 2245-SS.

P&H MODEL 600 1-yd. Gasoline shovel. Waukesha engine. Crane equipment also available. Good condition. Located Connecticut. Box 2113-SS

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

SMALL SHOVELS
Under 2 Yards continued

THEW-LORAIN MODEL 60, Factory rebuilt. Waukesha W. L. gas engine on 52 center drive crawler. Special price, cash, for quick purchaser.
Box 2264-SS

1¼-YARD

BUCYRUS-ERIE 41-B Steam shovel, dragline and crane. 21' shovel boom, 15' dipper handle, 1¼-yd. dipper. 50' clamshell—dragline boom. Used very intermittently. Excellent care. Good condition. Located Chicago. Box 2260-SS

BUCYRUS-ERIE 33-B—1¼-yard gas shovel — chain crowd. One year old. Located Northern Minnesota. Box 2213-SS.

BUCYRUS-ERIE GA-2—Gas-Air Extra High Lift Shovel. Waukesha 4-cylinder 6¼"x8". engine. Factory rebuilt since originally shipped. Good operating condition. Located near Boston. Box 2228-SS.

BUCYRUS-ERIE GA-3 Gas-Air 1¼ yard shovel. Single shaft cat. Electric starter. Waukesha 4-cylinder 6¼"x8" engine. First class condition. Located near St. Louis. Box 2162-SS.

BUCYRUS-ERIE GA-3 Gas-Air 1¼-yd. shovel. Waukesha 4-cylinder 6¼"x8" engine. Good operating condition. Now operating Arizona. Box 2090-SS.

BUCYRUS-ERIE. GA-2, Gas-Air. 1¼-yard shovel. Electric starter. Waukesha W.L. 4-cylinder 6¼"x8" engine. Single shaft cat. Extensively repaired recently. Located Texas. Box 2030-SS.

2—BUCYRUS-ERIE E-2 shovels and draglines. 1½-yard Plate dipper. 45' boom plus 10' extension. 1¼-yard Page drag bucket. Electric light plant. Atlas Diesel engines. Engines overhauled since last used. Balance of machines good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SS.

TWO—BUCYRUS-ERIE—GA-3, GAS-AIR 1¼-yard shovels. Wisconsin D-2—6 cyl. 5¼"x6½" engines. Good condition. St. Paul, Minnesota. Box 1097-SS.

BUCYRUS-ERIE 41-B — 1¼-YARD STEAM SHOVEL. Located near Boston. Electric light plant. Very good price. Box 1096-SS.

BUCYRUS-ERIE—41-B—STEAM SHOVEL. 21' boom, 15' dipper handle, 1¼-cubic yard dipper. Now operating. Will demonstrate. Located Alabama. Box 1131-SS.

BUCYRUS-ERIE GA-3—Gas-Air 1¼-yard high lift shovel and 45' boom clamshell machine. Electric starter. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Few minor repairs needed. Otherwise excellent condition. Located New Jersey. Box 2058-SS.

LIMA MODEL 101. 1¼-yard gas shovel. 50' boom dragline. Excellent condition. Located Texas. Box 2029-SS.

2—LIMA MODEL 101. 1¼-yard gasoline shovels. 26' boom. 17' dipper handle. Waukesha Model J. K. 6½"x7" engine. Recently rebuilt. Excellent condition. Located Texas. Box 2042-SS.

2 MARION Model 450—Steam Shovels. Good condition. Located Connecticut. Box 1154-SS.

MARION MODEL 32—1¼-yd. steam shovel. Boiler inspected February 1, 1938. Machine in good condition. Located Eastern Pennsylvania. Box 2101-SS.

1½-YARD

KOEHRING—Model 601. 1½ yd. Shovel and 55' Boom Clamshell and Dragline. Operating condition. Located Wisconsin. Box 2244-SS.

P&H MODEL 700-B. 1½-yd. Gasoline shovel. Waukesha engine. Good condition. Located Connecticut. Box 2114-SS.

1¾-YARD

BUCYRUS-ERIE 43-B Gas shovel. 22' boom, 17' dipper handle, 1½-yd. dipper. Chain crowd. Electric starter. Wisconsin 6-cylinder 6"x7" engine. Field reconditioned. Excellent shape. Located Boston. Box 2257-SS

BUCYRUS-ERIE 43-B late model 1¾-yd. chain crowd shovel. Electric starter. 1½ K.W. Kohler light plant. Buda-Lanova 6-cylinder 5¼"x7" Diesel engine. Located Central New York State. Excellent condition. Box 2019-SS.

BUCYRUS-ERIE—43-B Gasoline 1¾ yd. Chain Crowd Shovel. Good operating condition. Located Massachusetts. Box 2246-SS.

MARION—MODEL 480 High Lift Steam Shovel. Very good condition. Ready to go to work. Located Minnesota. Box 2215-SS

5—MARION MODEL 37, 1¾-yard steam shovels, steel cab. Good working condition. Located Minnesota. Box 2153-SS.

2-YARD

MARION MODEL 480—2-yd. Steam shovel. Vertical boiler. Boiler inspected February 1, 1938. Excellent condition. Located Eastern Pennsylvania. Box 2102-SS.

NORTHWEST—MODEL 80—2-yard gas shovel. Twin City 8"x9" engine. Actually used about 20 months. Since fully repaired except dipper. Excellent condition. Located State of Washington. Box 2214-SS.

If You Do Not Find What You Want Listed—Write Us EXCAVATING engineer South Milwaukee, Wis.

SMALL DRAGLINES
Under 2 Yards

⅜-YARD

BUCYRUS-ERIE 10-B Gas Dragline, 28' Boom. ⅜-yd. AU Drag bucket. Battery lights and electric starter. 14" cat treads. Field reconditioned. Located Texas. Box 2219-SD.

½-YARD

AUSTIN-WESTERN — ½-Yd. dragline and shovel. ½-Yd. Page drag bucket. Dragline equipment practically new. Very good condition. Located Wyoming. Box 2224-SD.

BUCYRUS-ERIE 16-B Gas dragline, clamshell and shovel. 35' Dragline—Clamshell boom. ⅝-Yd. shovel dipper. Winch head. Electric starter. Waukesha 6-cylinder 4"x4¾" engine. Very good condition. Located North Carolina. Box 2226-SD.

UNIVERSAL—Gas ½-yd. Shovel and 35' Boom Dragline on Thew Style caterpillar mounting. Distributor frame for truck mounting also included. Fair working condition. Located near Chicago. Box 2233-SD.

⅝-YARD

BYERS MODEL 128. ⅝-yd. Gas dragline 35' boom including ½-yd. Page "C" drag bucket. 4-cylinder Diamond T engine. Engine overhauled 1937. Good operating condition. Located Illinois. Box 2087-SD.

NORTHWEST MODEL 2, 40' boom dragline—Page ⅝-yard R. C. dragbucket. Kohler light plant. Wisconsin 4-cylinder 5¼"x6½" engine. Very good operating condition. Located Illinois. Box 2209-SD.

¾-YARD

LORAIN MODEL 55 Gasoline dragline. 40' boom. Williams drag bucket included. Waukesha JL engine. Located So. Carolina. Box 2259-SD

AUSTIN MODEL "MA"—Gasoline Dragline—37' Boom—¾ yd. Page "M" drag bucket. Good operating condition. Located western Nebraska. Box 2198-SD.

NORTHWEST MODEL 105 GAS—40' boom dragline and clamshell, including Page "C" drag bucket. Climax engine. Reasonably good operating condition. Located Atlanta, Ga. Box 995-SD.

⅞-YARD

BUCYRUS-ERIE 1035 Gasoline 40' boom dragline and clamshell, including 1-yd. dragline and clamshell buckets. 26" cat. treads. Waukesha engine. Recently overhauled. Located Colorado. Box 2177-SD.

1-YARD

BUCYRUS-ERIE 30-B Diesel 40' boom dragline. Atlas Diesel 3-cylinder 8½"x10½" engine. $1,500 repairs recently applied. Excellent condition. Located near Chicago. Box 2132-SD.

BUCYRUS-ERIE 32-B Gas 50' boom dragline and 1-yd. "U" Drag bucket. Electric starter. Wisconsin engine. Good operating condition. Located Eastern Pennsylvania. Box 2088-SD.

BUCYRUS-ERIE D-2 — DIESEL DRAGLINE. Atlas engine. Located Texas. 40' Boom, 1¼ yd. Page Bucket. Field reconditioned. Excellent mechanical and operating condition. Box 1020-SD.

LORAIN—Model 55. 40' Boom Gas Dragline and ¾ yd. Williams drag bucket. Operating condition. Located North Carolina. Box 2242-SD.

NORTHWEST—Model 105. 1 yard Shovel and 40' Boom Clamshell and Dragline including 1 yd. Williams clamshell bucket. Field reconditioned summer 1938. Good operating condition. Located Wisconsin. Box 2245-SD.

1¼-YARD

BUCYRUS-ERIE 41-B Steam dragline, shovel and crane. 50' clamshell-dragline boom. 21' shovel boom, 15' dipper handle. 1¼-yd. dipper. Used very intermittently. Excellent care. Good condition. Located Chicago. Box 2260-SD

BUCYRUS-ERIE GA-2, Gas-Air 45' boom dragline. Electric starter. Battery lighting system. Waukesha 4-cyinder 6¼"x8" engine. Operating condition. Located Minneapolis, Minn. Box 2210-SD.

BUCYRUS-ERIE E-2 dragline and shovel. 45' boom plus 10' extension. 1¼-yard Page drag bucket. 1½-yard plate dipper. Electric light plant. Atlas Diesel engine. Engine overhauled since last used. Balance of machine good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SD.

LIMA MODEL 101, 1¼-yd. gas 50' boom dragline and shovel. Excellent condition. Located Texas. Box 2029-SD.

P & H—MODEL 210—55' boom dragline including 1¼-yard Page bucket. Gas powered. Located South Dakota. Box 1172-SD.

1½-YARD

KOEHRING—Model 601. 55' boom dragline and clamshell and 1½-yard shovel. Operating condition. Located Wisconsin. Box 2244-SD.

LINK-BELT K-44 Dragline. 44' Boom plus 8' Extension—55'. 1½-yd. Omaha bucket. Waukesha 4-cylinder 6¾"x8" engine. Located Northwestern Missouri. Box 2230-SD.

NORTHWEST MODEL 6 dragline. Boom 50' plus 10' extension. 1⅝-yard Page R. C. dragbucket. Kohler light plant. Murphy Diesel engine. Approximately 1 year old. Excellent condition. Located Illinois. Box 2208-SD.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

SMALL CLAMSHELLS AND CRANES
Under 2 Yards

⅜-YARD

BAY CITY—⅜-YARD GAS CLAMSHELL. Also drag shovel equipment. Located near Boston. Box 1084-SCC

½-YARD

BUCYRUS-ERIE 16-B Gas clamshell, dragline and shovel. 35' clamshell—dragline boom. Winch head. ⅝-Yd. shovel dipper. Electric starter. Waukesha 6-cylinder 4"x4¾" engine. Very good condition. Located North Carolina. Box 2226-SCC.

P&H MODEL 300—Gas ½-yd. Clamshell. 35' Boom. Also Trench Hoe Equipment. Located near Chicago. Box 2223-SCC.

P & H MODEL 204. 35' boom gasoline clamshell. ⅝-yard Kiesler clamshell bucket. Waukesha engine. New cab. Generally very good condition. Located Chicago. Box 2036-SCC.

¾-YARD

BUCYRUS-ERIE—TYPE B, ¾-yard, 40' boom steam clamshell and shovel. Cat. mounted. Located Buffalo, New York. Box 2005-SCC.

NORTHWEST MODEL 105 GAS — 40' boom clamshell and dragline, including Page "C" drag bucket. Climax engine. Completely reconditioned. Located Atlanta, Ga. Box 995-SCC.

P&H MODEL 400—Combination gasoline crane and ¾-yard shovel. Crane boom 35' plus 10' extension. Waukesha 4-cylinder 5"x6¼" engine. Located vicinity Boston. Box 2203-SCC

⅞-YARD

BUCYRUS-ERIE 1035 Gasoline 40' boom clamshell and dragline including 1-yd. clamshell and dragline buckets. 26" cat. treads. Waukesha engine. Recently overhauled. Located Colorado. Box 2177-SCC

1-YARD

BUCYRUS-ERIE — GA-2 — GAS-AIR 45' Boom Clamshell Machine. Good Operating Condition. Located St. Paul, Minn. Box 1024-SCC.

BUCYRUS-ERIE — GA-2 GAS AIR Clamshell. 45' boom. Single Shaft Caterpillar. Waukesha 4 cylinder 6¼"x8" engine. Rebuilt since original manufacture. Good operating condition. Located New Jersey. Box 1104-SCC.

NORTHWEST—Model 105. 40' boom dragline and clamshell, including 1-yard Williams clamshell bucket. Also 1-yard shovel equipment. Field reconditioned summer 1938. Good operating condition. Located Wisconsin. Box 2245-SCC.

NORTHWEST MODEL 105—45' boom gas crane. Good operating condition. Located vicinity Duluth, Minnesota. Box 2204-SCC.

P&H MODEL 600, 1-yd. gasoline shovel. Crane equipment also available. Waukesha engine. Good condition. Located Connecticut. Box 2113-SCC.

1¼-YARD

BUCYRUS-ERIE GA-3 — Gas-Air 1¼-yd. 45' boom clamshell and high lift shovel. Electric starter. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Few minor repairs needed. Otherwise excellent condition. Located New Jersey. Box 2058-SCC.

LINK-BELT, MODEL K-2. Gas crane. 50' boom. Also 2 extra 20' inserts to make 90'. Weight 67,000 lbs. Located St. Paul, Minn. Box 2013-SCC.

BUCYRUS-ERIE 41-B steam crane, dragline and shovel. 50' clamshell-dragline boom. 21' shovel boom, 15' dipper handle, 1¼-yd. dipper. Used very intermittently. Excellent care. Good condition. Located Chicago. Box 2260-SCC

1½-YARD

KOEHRING—Model 601. 55' boom clamshell and dragline, and 1½-yard shovel. Operating condition. Located Wisconsin. Box 2244-SCC.

LARGE SHOVELS AND DRAGLINES
2 Yards and Over

BUCYRUS-ERIE 50-B, 2-yd. steam shovel. Good operating condition. Located Central New York State. Box 2020-LSD.

BUCYRUS-ERIE 50-B Diesel Dragline Kohler Light Plant. Used only 4 years. Good condition. Located Illinois. Box 2083-LSD.

BUCYRUS-ERIE — 52-B — DIESEL 2¼ yard Shovel and Dragline. Atlas engine. Good condition. Located Eastern Pa. Box 1039-LSD.

BUCYRUS-ERIE 55-B—Extra High Lift Diesel Shovel. 35-ft. boom, 22-ft. dipper handle, 2 cu. yd. Bowl Door dipper. Caterpillar mounted. Kohler light plant. Atlas Diesel engine. Used about three months. Just like new. Located Eastern Pennsylvania. Box 1069-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper and sticks. Chicago territory. Box 2164-LSD.

BUCYRUS-ERIE—CLASS 24 DIESEL dragline. 130-ft. boom, 4 cu. yd. bucket. Truck mounted. 165 h.p. Anderson Diesel engine. Friction drive. Said to be in good operating condition. Located on Mississippi River near New Orleans convenient for loading on barge. Box 1074-LSD.

ANY FAIR OFFER ACCEPTED

BUCYRUS-ERIE—Class 24 steam dragline. 100 foot boom, 5 cubic yard bucket. Skid and roller mounted. Rebuilt 1927 at a cost of $15,000. New locomotive boiler installed 1928. Will accept any fair offer. Located near Fort Worth, Texas. Box 2149-LSD.

BUCYRUS-ERIE 95-C. 3-yard steam shovel. Cats. installed 1925. Fair condition. Located Kansas. Box 2050-LSD.

BUCYRUS-ERIE — 100-B — STEAM SHOVEL. 3 yard Dipper. Machinery very good condition. Located Montreal, Canada. Box 1041-LSD.

BUCYRUS-ERIE 100-B Electric shovel. 2300 volt, Ward Leonard control. New 1927, excellent operating condition. 3-cu. yd. dipper. Box 2263-LSD

BUCYRUS-ERIE 175-B 2 Motor AC Electric Dragline. Truck Mounted. 125' boom. 1 each 4-, 5-, and 6-yd. drag buckets. Chain drive from main motor to intermediate shaft. Extra rotors for main and swing motors and other spare parts. 3—75 KVA 60 cycle 2200/220/440 volt transformer mounted on machine. Power supply 3 phase 60 cycle 440 volt. Completely overhauled since received from factory. First class operating condition. Located Kansas. Box 2082-LSD.

BUCYRUS-ERIE—Class 230 Steam Dragline. 175-foot steel and aluminum boom. 6-yard RED ARCH bucket. Ready to work. Located near New Roads, Louisiana. Box 2152-LSD.

BUCYRUS-ERIE—Class 320 Steam Dragline, 144-foot boom. 8-yard bucket. Located on Illinois River. A good buy. Box 2155-LSD.

COAL MINE SHOVELS

MARION MODEL 250 STEAM SHOVEL (less dipper handles) with 3 cu. yd. dipper. Also Sullivan 9x12x10 air compressor and receiver.

BUCYRUS 27-D STEAM horizontal thrust coal loader 1½ cu. yd. capacity.

BUCYRUS 225-B ELECTRIC SHOVEL, Ward--Leonard control, with Model 320-B electric machinery. 80' boom, 52' handles. 8 cu. yd. dipper.

All in first class serviceable condition. Available for immediate dismantling. Located near Ft. Smith, Arkansas. Box 2194-LSD.

BUCYRUS-ERIE — TOWER EXCAVATOR. 130' head tower. 50' tail tower. 12-yard bottomless bucket. Electrical equipment 3 phase 60 cycle 4000 volts Ward Leonard. WILL RENT. Located Louisiana. Box 2069-LSD.

BUCYRUS-MONIGHAN 1½-T Diesel dragline. 60' boom. Located Kansas. Box 2168-LSD

BUCYRUS-MONIGHAN 2-T Diesel Dragline. 70' boom. Located Kansas. Box 2169-LSD

BUCYRUS-MONIGHAN 2-W Diesel dragline. 70' boom. Located Louisiana. Box 2170-LSD

BUCYRUS-MONIGHAN 3-T Diesel dragline. 77' boom. Located Louisiana. Box 2171-LSD

BUCYRUS-MONIGHAN 3-T DIESEL dragline. Located Arkansas. Box 1056-LSD.

BUCYRUS-MONIGHAN Model 2½-T—70' boom dragline. 2½-yard dragbucket. Fairbanks Morse Diesel engine. Located North Dakota. Box 2205-LSD

BUCYRUS-MONIGHAN 4-W Walking dragline, 80' boom 5½ yard Page bucket, 30' boom insert and 4-yard bucket. Located Tennessee. Box 2150-LSD.

BUCYRUS-MONIGHAN 4-W Diesel Dragline. 110' Boom. 4½-yd. Bucket. Reported good working condition. Located Georgia. Box 2232-LSD.

BUCYRUS-MONIGHAN 5-W Diesel Dragline. 90' Boom. Electric swing. Vortex Air Oil Cleaners. Electric fan in operators platform. 5-yd. "Y" drag bucket. Fairbanks Morse 250 HP Type 38-D 5-cylinder 10"x10½" pump scavenging engine. Auxiliary Waukesha gas engine. Good working condition. Located Colorado River Aqueduct near Indio, Cal. Box 2079-LSD.

BUCYRUS-MONIGHAN MODEL 6160 — Diesel Dragline. 160' boom. 6-yard drag bucket. Fairbanks-Morse Diesel engine. $15,000 extras added since machine was recently purchased. Will rent. Located Montana. Box 2068-LSD.

MARION MODEL 60. 2½-yard steam shovel on railroad trucks. Good appearance and condition. Located Kansas. Box 2051-LSD.

MARION — MODEL 70-E — 3½ yard Electric Shovel. Railway truck mounted. Power Equipment, 3 Phase, 60 cycle, 2300 volt. Good condition. Located Ohio. Box 1050-LSD.

MARION—MODEL 350—3 yard Electric Shovel. Power equipment, 3 Phase, 60 cycle, 2300 volt — Ward-Leonard Control. Mounted on railway trucks. Good condition. Located Minnesota. Box 1049-LSD.

PAGE—MODEL 220—2½ yard Diesel Dragline. 85' Boom. Good operating condition. Located Iowa. Now operating. Box 1052-LSD.

P&H MODEL 800. Diesel 2½-yd. shovel and 80' boom dragline. 2½-yd. Page RC drag bucket. 6-cylinder Atlas 9"x10½" engine. Overhauled October 1938. Now working. Can be inspected. Located Eastern Pennsylvania. Box 2258-LSD

P&H MODEL 900, 3½ yard Diesel Shovel, 33-foot boom, 200 h.p. Fairbanks-Morse engine. Mounted on caterpillars. Box 2151-LSD.

LOCOMOTIVES

STANDARD GAUGE LOCOMOTIVES BARGAINS

2—Baldwin 77-ton 19x26
4—Baldwin 51-ton 17x24
1—American 60-ton 20x26

Located in Minnesota.

Box 2147-ME.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

MISCELLANEOUS EQUIPMENT

FOR SALE: Heavy-Duty Blaw-Knox dragline bucket in A-1 shape $200.00
Complete one-yard shovel attachment for Lorain 60 or 75 ..... $675.00
S. N. Yarbrough, P. O. Box 502
Shreveport, Louisiana

FOR SALE
2 Linn Tractors.
45-ton Rogers Trailer, latest type, pneumatic tires. Excellent condition.
Plymouth Excavating Co., Inc., Plymouth, Pa.

CATERPILLAR RD8 TRACTOR—with 12-yd. Type "U" Le Tourneau Carry-All Scraper. One year old—good condition. Located near New York. Box 2235-ME

52—8-YD. PHOENIX TYPE QUARRY CARS, 4'8½" gauge, Std., heavy axles, good condition, have been used on tipple dump, ¾" size MCB couplers.

15—8-YD. SIDE DUMP CARS, Std. gauge, wood bodies, steel under-frame.
Box 2262-ME

FOR SALE
Front-end equipment of 50-B W. L. Electric Horizontal Crowd 2 cu. yd. Coal-Loader. In good mechanical condition. Located Kansas. Box 2217-ME.

AMSCO—2½-Yard Manganese Steel, heavy-duty, rock type dragline bucket, including all necessary chains and 11 teeth. Located Minnesota.
Box 2216-ME

1—20-TON ALL STEEL GUY DERRICK, 80' mast, 75' boom complete with 6 Guy cables approximately 250' long. Includes Dake steam engine driven winch bolted on side of mast complete with load and cables. Also electric motor in addition to Dake engine. Hand swing. Also included one Westinghouse cross-compound steam driven air compressor. Approximate weight 20,000 lbs. Located Wisconsin. Box 2156-ME.

BROWNHOIST 50' boom steam locomotive crane. Standard gauge car wheel mounted. Overhauled 1937. Located vicinity Chicago.
Box 2136-ME

AUSTIN MODEL 42-15 DITCHER. Twin City Gas Engine. 4-Cylinder 7¼"x9". Will cut 22" minimum to 42" maximum width to approximately 20' depth. Has seen comparatively little service and few repairs needed. Completely overhauled before last job. Will demonstrate on notice. Located North Carolina.
Box 2222-ME.

BROWNHOIST 40' boom steam locomotive crane. Standard gauge car wheel mounting. Fair condition. Located vicinity Chicago.
Box 2135-ME

SHEET STEEL PILING. 16 Pieces. Carnegie Type M-112. 16" wide, ⅝" thick—30.6 lb. per foot. Excellent condition. Located Wisconsin.
Box 2237-ME.

QUARRY SHOVEL—MOTOR-GENERATOR SET—4 YARD.
ONE GENERAL ELECTRIC MOTOR-GENERATOR SET consisting of 250 HP synchronous motor 2300/4000 Volts, Hoist generator 125 KW, Swing generator 40 KW, Crowd generator 39 KW, and one Exciter motor-generator set driven by 15 HP Induction motor and one Stationary panel for starting synchronous motor. All in good operating condition, ready for immediate service. Located Minnesota. Box 2240-ME.

LOCOMOTIVE CRANES
4—Standard gauge locomotive cranes, three—20-ton, one—10-ton. Offered at bargain prices. Located Minnesota.
Box 2146-ME.

DIPPER FOR SALE
1—3-yard Aluminum Dipper complete. Lip, teeth and front castings of Manganese Steel. Pyramid Coal Corp., Pinckneyville, Ill.

FRUEHOFF SEMI-TRAILER with 8' by 40' Deck. (Can be shortened.) Single rear axle with 4 wheels each with 36"x10" solid rubber tires. Air Brakes. 16 ton capacity. Excellent condition. Located New York. Box 1160-ME.

COAL MINE EQUIPMENT
PRICED TO SELL. The following equipment located a short distance from Ft. Smith, Arkansas may be had at bargain prices for immediate delivery.
No. 3 Centrifugal pump with 10 h.p. motor.
4" Centrifugal pump.
8" Centrifugal pump, direct connected with 50 h.p. motor.
3" Centrifugal pump with 7½ h.p. motor.
I-R compressor with motor and receiver mounted on wagon.
3—I-R paving breakers.
Wood tipple to include 36" drag conveyor with 20 h.p. motor and switch on Conveyor, 15 h.p. motor and switch on conveyor,
15 h.p. motor & switches on shaker,
5 h.p. motor & switches on lump boom,
5 h.p. motor & switches on egg boom,
3 h.p. motor & switch on lump boom hoist.
2—10 KVA transformers.
50 tons good No. 60 relaying steel with six No. 8 turn-outs.
For full particulars, write Box 2193-ME.

If You Do Not Find What You Want Listed—Write Us
EXCAVATING engineer
South Milwaukee, Wis.

3 CU. YD. AX BUCYRUS-ERIE DRAG BUCKET with hoists and drag bail chains, Spreader dump sheave, teeth, hoist and drag socket. Practically new condition. Located Eastern Pennsylvania. Box 2245-ME.

DRAG BUCKET
1½-YARD Type "Y" Bucyrus-Erie Drag Bucket. Good condition. Located Kansas.
Box 1166-ME.

DRAGLINE EQUIPMENT
72-ft. Dragline Boom and Fairlead (suitable Bucyrus-Erie 75-B)—Hydraulic Equipment—1 Hoist Drum—1 Drag Drum—1 Boom Suspension, Sway Brace and Suspension Cables. Located Eastern Pennsylvania. Box 1060-ME

1—Allis-Chalmers Newhouse 5" Crusher.
1—150' Conveyor, 24" belt, steel frame.
1—40' Conveyor, 24" belt, steel frame.
1—28' Screen, 4' Diameter.
1—No. 2 Auger Sand Washer, 14'.
1—4-yard steel Hopper.
1—4" water pump.
Box 2250-ME.

CAR TRANSPORTER
CAR-TRANSPORTER or stacker with reach of 135' and dumping height of 75'. Equipped with 4-yard aluminum car. Caterpillar-mounted and suitable for use with shovel having per hour output of 250 yards. Electric drive, 3-phase, 60-cycle, 4000-volt current. This car transporter is in excellent condition and priced to sell. Located near Kansas City, Missouri. Box 2010-ME.

BUCYRUS-ERIE — 55-B Front End Shovel Equipment consisting of 27'6" boom, 18' dipper handle and 2½ yd. Dipper. All in perfect condition, having been used not enough to require replacement of racks or pinions. Located Ohio. Box 2241-ME.

BUCYRUS-ERIE—41-B Shovel Equipment. Consisting of 21' boom, 15' dipper handle, and 1¼ yd. dipper. Located New Jersey. Bargain price. Box 2239-ME.

SHOVEL EQUIPMENT—For Bucyrus-Erie 52-B Diesel. Handled only about 4,000 yards material. Equipment located Alabama.
Box 1113-ME

FRONT FOR 32 MARION
1½ CU. YD. shovel front end—new dipper—for Marion 32 steamer. Priced right. Located near Chicago. Box 2165-ME.

ONE METALWELD, 2-cylinder, 7"x6" vertical Air Compressor, 162 cu. ft. capacity—with subframe and extended shaft with half-coupling. Includes water pump, 18"x41" Metalweld air tank, gauges, etc. Located Pennsylvania.
Box 2200-ME

KOEHRING DRAG SHOVEL equipment for Model 301 machine. Used very little. Low price. Located Eastern New York State.
Box 1181-ME.

USED CONTRACTORS EQUIPMENT
1—Model 100 Lincoln Revolver with 100' boom and 12' Gantry.
2—275 Koehring Mixers with Electric motors.
1—200-ton Blaw-Knox Bin with weighing batchers, cement scale and push button control.
1—Robinson Pneumatic cement unloader with silo.
1—20-ton Whitcomb Gasoline Dinkey, overhauled.
4—18-ton Steam Dinkeys, overhauled.
12—30-yd. Western Lift Door Air Dump cars.
4—30-yd. Koppel Drop Door Air Dump cars.
26—16-yd. K. & J. Lift Door Air Dump cars.
6—20-yd. K. & J. Lift Door Air Dump cars.
5—2-cu. yd. Blaw-Knox Roller gate Concrete Buckets.
7—70-ton 20x36 Baldwin Switchers.
8—Jordan spreaders excellent condition.
Located Mississippi valley. Box 2011-ME.

DRAG SHOVEL EQUIPMENT—For Bucyrus-Erie 1020 shovel. Located Rhode Island.
Box 2003-ME

SURPLUS MINE EQUIPMENT BARGAIN PRICES
Write for prices of this equipment. Save money. Located in Minnesota.
5—Boilers, locomotive and horisontal return tube types, 150 H.P.
14—Flat cars, 36" gauge, 18-ton.
1—Carroll crusher, jaw, 44x28.
1—Motor, 135 H.P. squirrel cage, 1150 r.p.m., 220 v., 3 ph., 60 cy., A. C.; compensator.
3—Rotary converters, 300 Kw., HCC-6-300-1200, Forms P, D, & V, 6 and 3 phase.
1—Switchgear for 3-phase rotary converter, complete, semi-automatic.
3—Transformers, 300 Kw., 66,000 V. Primary, reconnected for 22,000 V. Primary.
1—Ainley placer gold machine, complete. 4-bowl with feed hopper for dragline operation. 40-50 tons per hour.
1—Hoist, double drum.
1—Bucket loader.
8—Pumps, steam (1 gas engine driven) from 49 to 3700 g.p.m.
1—Tractor, Twin City No. 12-20.
1—Water softener, 5 ft., complete.
2—Drums mine hoist, dia. 50", width 40", flange 7", capacity 400' one-inch rope.
Box 2145-ME.

BLAST-HOLE DRILLS
14—Sanderson-Cyclone Model 14, non-traction—six Model 14-SR, traction type, electric blast-hole drills. Also six Loomis Clippers—Models 4 and 44, steam traction. All in good condition, available for immediate shipment. Located New York. Priced to sell. Box 2167-ME.

WANTED

WANTED: Sand and Gravel Washing and Screening Plant. Box 2261-ME